VLAAMSE OVERHEID

DEPARTEMENT MOBILITEIT EN OPENBARE WERKEN
WATERBOUWKUNDIG LABORATORIUM

# Langdurige metingen Deurganckdok: Opvolging en analyse aanslibbing

Bestek 16EB/05/04


## Deelrapport 2.14 : 13-uursmeting Sediview op 11/03/2008 tijdens springtij - Deurganckdok (transect DGD)

## Report 2.14 : Through Tide Measurement Sediview on 11/03/2008 during spring tide - Deurganckdok (transect DGD)

12 August 2008
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en

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# 1. INTRODUCTION

## 1.1. The assignment

This report is part of the set of reports describing the results of the long-term measurements This report is part of the set of reports describing the results of the long-term measurements conducted in Deurganckdok aiming at the monitoring and analysis of silt accretion. This measurement campaign is an extension of the study "Extension of the study about density currents in the Beneden Zeeschelde" as part of the Long Term Vision for the Scheldt estuary. It is complementary to the study 'Field measurements high-concentration benthic suspensions (HCBS 2)'.

The terms of reference for this study were prepared by the 'Departement Mobiliteit en Openbare Werken van de Vlaamse Overheid, Afdeling Waterbouwkundig Laboratorium' (16EB/05/04). The repetition of this study was awarded to International Marine and Dredging Consultants NV in association with WL|Delft Hydraulics and Gems International on 10/01/2006. The project term was prolonged with an extra year from April 2007 till March 2008.

Waterbouwkundig Laboratorium– Cel Hydrometrie Schelde provided data on discharge, tide, salinity and turbidity along the river Scheldt and provided survey vessels for the long term and through tide measurements. Afdeling Maritieme Toegang provided maintenance dredging data. Agentschap voor Maritieme Dienstverlening en Kust – Afdeling Kust and Port of Antwerp provided depth sounding measurements.

The execution of the study involves a twofold assignment:

- Part 1: Setting up a sediment balance of Deurganckdok covering a period of one year, i.e. 04/2007 – 03/2008
- Part 2: An analysis of the parameters contributing to siltation in Deurganckdok

## 1.2. Purpose of the study

The Lower Sea Scheldt (Beneden Zeeschelde) is the stretch of the Scheldt estuary between the Belgium-Dutch border and Rupelmonde, where the entrance channels to the Antwerp sea locks are located. The navigation channel has a sandy bed, whereas the shallower areas (intertidal areas, mud flats, salt marshes) consist of sandy clay or even pure mud sometimes. This part of the Scheldt is characterized by large horizontal salinity gradients and the presence of a turbidity maximum with depth-averaged concentrations ranging from 50 to 500 mg/l at grain sizes of 60 - 100 $\mu$m. The salinity gradients generate significant density currents between the river and the entrance channels to the locks, causing large siltation rates. It is to be expected that in the near future also the Deurganckdok will suffer from such large siltation rates, which may double the amount of dredging material to be dumped in the Lower Sea Scheldt.

Results from the study may be interpreted by comparison with results from the HCBS and HCBS2 studies covering the whole Lower Sea Scheldt. These studies included through-tide measurement campaigns in the vicinity of Deurganckdok and long term measurements of turbidity and salinity in and near Deurganckdok.

The first part of the study focuses on obtaining a sediment balance of Deurganckdok. Aside from natural sedimentation, the sediment balance is influenced by the maintenance and capital dredging works. This involves sediment influx from capital dredging works in the Deurganckdok, and internal relocation and removal of sediment by maintenance dredging works. To compute a sediment balance an inventory of bathymetric data (depth soundings), density measurements of the

deposited material and detailed information of capital and maintenance dredging works will be made up.

The second part of the study is to gain insight in the mechanisms causing siltation in Deurganckdok, it is important to follow the evolution of the parameters involved, and this on a long and short term basis (long term & through-tide measurements). Previous research has shown the importance of water exchange at the entrance of Deurganckdok is essential for understanding sediment transport between the dock and the river Scheldt.

## 1.3. Overview of the study

### 1.3.1. Reports

Reports of the project 'Opvolging aanslibbing Deurganckdok' between April 2007 till March 2008 are summarized in Table 1-1. An overview of the HCBS2 and 'Opvolging aanslibbing Deurganckdok' (between April 2006 till March 2007) reports are given in APPENDIX K.

This report 2.14, is one of a set of reports that gains insight in sediment and water transport between Deurganckdok and the river Scheldt, which belongs to the second part of this project.

*Table 1-1: Overview of Deurganckdok Reports*

| Report | Description |
|---|---|
| **Sediment Balance: Bathymetry surveys, Density measurements, Maintenance and construction dredging activities** | |
| 1.10 | Sediment Balance: Three monthly report 1/4/2007 - 30/06/2007 (I/RA/11283/07.081/MSA) |
| 1.11 | Sediment Balance: Three monthly report 1/7/2007 – 30/09/2007 (I/RA/11283/07.082/MSA) |
| 1.12 | Sediment Balance: Three monthly report 1/10/2007 – 31/12/2007 (I/RA/11283/07.083/MSA) |
| 1.13 | Sediment Balance: Three monthly report 1/1/2007 – 31/03/2007 (I/RA/11283/07.084/MSA) |
| 1.14 | Annual Sediment Balance (I/RA/11283/07.085/MSA) |
| **Factors contributing to salt and sediment distribution in Deurganckdok: Salt-Silt (OBS3A) & Frame measurements, Through tide measurements (SiltProfiling & ADCP) & Calibrations** | |
| 2.09 | Calibration stationary equipment autumn (I/RA/11283/07.095/MSA) |
| 2.10 | Through tide measurement Siltprofiler 23 October 2007 (I/RA/11283/07.086/MSA) |
| 2.11 | Through tide measurement Salinity Profiling winter (I/RA/11283/07.087/MSA) |
| 2.12 | Through tide measurement Sediview winter 11 March 2008 Transect I (I/RA/11283/07.088/MSA) |
| 2.13 | Through tide measurement Sediview winter 11 March 2008 Transect K (I/RA/11283/07.089/MSA) |
| 2.14 | Through tide measurement Sediview winter 11 March 2008 Transect DGD (I/RA/11283/07.090/MSA) |
| 2.15 | Through tide measurement Siltprofiler 12 March 2008 (I/RA/11283/07.091/MSA) |
| 2.16 | Salt-Silt distribution Deurganckdok summer (21/6/2007 – 30/07/2007) (I/RA/11283/07.092/MSA) |
| 2.17 | Salt-Silt distribution & Frame Measurements Deurganckdok autumn (17/09/2007 - 10/12/2007) (I/RA/11283/07.093/MSA) |

| Report | Description |
|---|---|
| 2.18 | Salt-Silt distribution & Frame Measurements Deurganckdok winter (18/02/2008 - 31/3/2008) (I/RA/11283/07.094/MSA) |
| 2.19 | Calibration stationary & mobile equipment winter (I/RA/11283/07.096/MSA) |
| **Boundary Conditions: Upriver Discharge, Salt concentration Scheldt, Bathymetric evolution in access channels, dredging activities in Lower Sea Scheldt and access channels** | |
| 3.10 | Boundary conditions: Three monthly report 1/4/2007 – 30/06/2007 (I/RA/11283/07.097/MSA) |
| 3.11 | Boundary conditions: Three monthly report 1/7/2007 – 30/09/2007 (I/RA/11283/07.098/MSA) |
| 3.12 | Boundary conditions: Three monthly report 1/10/2007 – 31/12/2007 (I/RA/11283/07.099/MSA) |
| 3.13 | Boundary conditions: Three monthly report 1/1/2008 – 31/03/2008 (I/RA/11283/07.100/MSA) |
| 3.14 | Boundary conditions: Annual report (I/RA/11283/07.101/MSA) |
| **Analysis** | |
| 4.10 | Analysis of Siltation Processes and Factors (I/RA/11283/07.102/MSA) |

### 1.3.2. Measurement actions

Following measurements have been carried out during the course of this project:

1. Monitoring upstream discharge in the Scheldt river
2. Monitoring Salt and sediment concentration in the Lower Sea Scheldt taken from on permanent data acquisition sites at Lillo, Oosterweel and up- and downstream of the Deurganckdok.
3. Long term measurement of salt distribution in Deurganckdok.
4. Long term measurement of sediment concentration in Deurganckdok
5. Monitoring near-bed processes in the central trench in the dock, near the entrance as well as near the landward end: near-bed turbidity, near-bed current velocity and bed elevation variations are measured from a fixed frame placed on the dock's bed.
6. Measurement of current, salt and sediment transport at the entrance of Deurganckdok for which ADCP backscatter intensity over a full cross section are calibrated with the Sediview procedure and vertical sediment and salt profiles are recorded with the SiltProfiler equipment
7. Through tide measurements of vertical sediment concentration profiles -including near bed highly concentrated suspensions- with the SiltProfiler equipment. Executed over a grid of points near the entrance of Deurganckdok.
8. Monitoring dredging activities at entrance channels towards the Kallo, Zandvliet and Berendrecht locks
9. Monitoring dredging and dumping activities in the Lower Sea Scheldt

In situ calibrations were conducted on several dates to calibrate all turbidity and conductivity sensors, a description can be found in IMDC (2006a; 2007a; 2008f; 2008o).

## 1.4. Structure of the report

This report is the factual data report of the through tide measurements at the entrance of Deurganckdok on the 11th of March 2008. The first chapter comprises an introduction. The second chapter describes the measurement campaign and the equipment. Chapter 3 describes the course of the actual measurements. The results and processed data are presented in Chapter 4, whereas chapter 5 gives a preliminary analysis of the data.

# 2. THE MEASUREMENT CAMPAIGN

## 2.1. Overview of the parameters

The first part of the study aims at determining a sediment balance of Deurganckdok and the net influx of sediment. The sediment balance comprises a number of sediment transport modes: deposition, influx from capital dredging works, internal replacement and removal of sediments due to maintenance dredging (Figure 2-1).

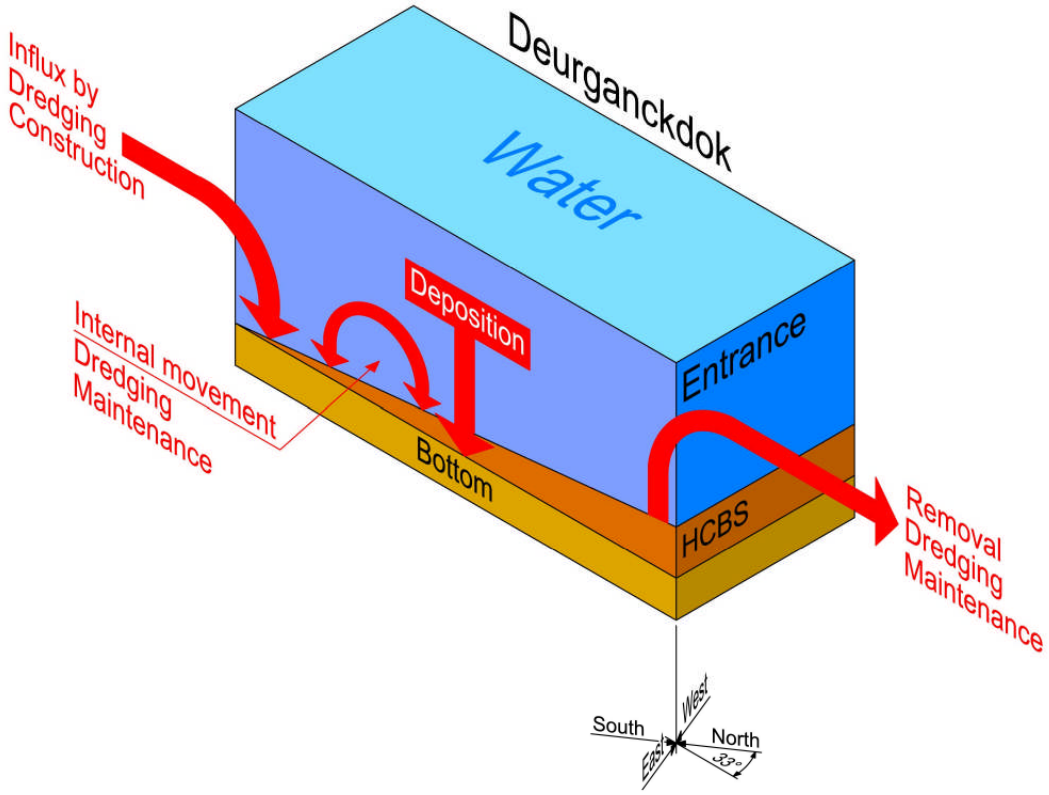



*Figure 2-1: Elements of the sediment balance*

A net deposition can be calculated from a comparison with a chosen initial condition $t_0$ (Figure 2-2). The mass of deposited sediment is determined from the integration of bed density profiles recorded at grid points covering the dock. Subtracting bed sediment mass at $t_0$ leads to the change in mass of sediments present in the dock (mass growth). Adding cumulated dry matter mass of dredged material removed since $t_0$ and subtracting any sediment influx due to capital dredging works leads to the total cumulated mass entered from the Scheldt river since $t_0$.

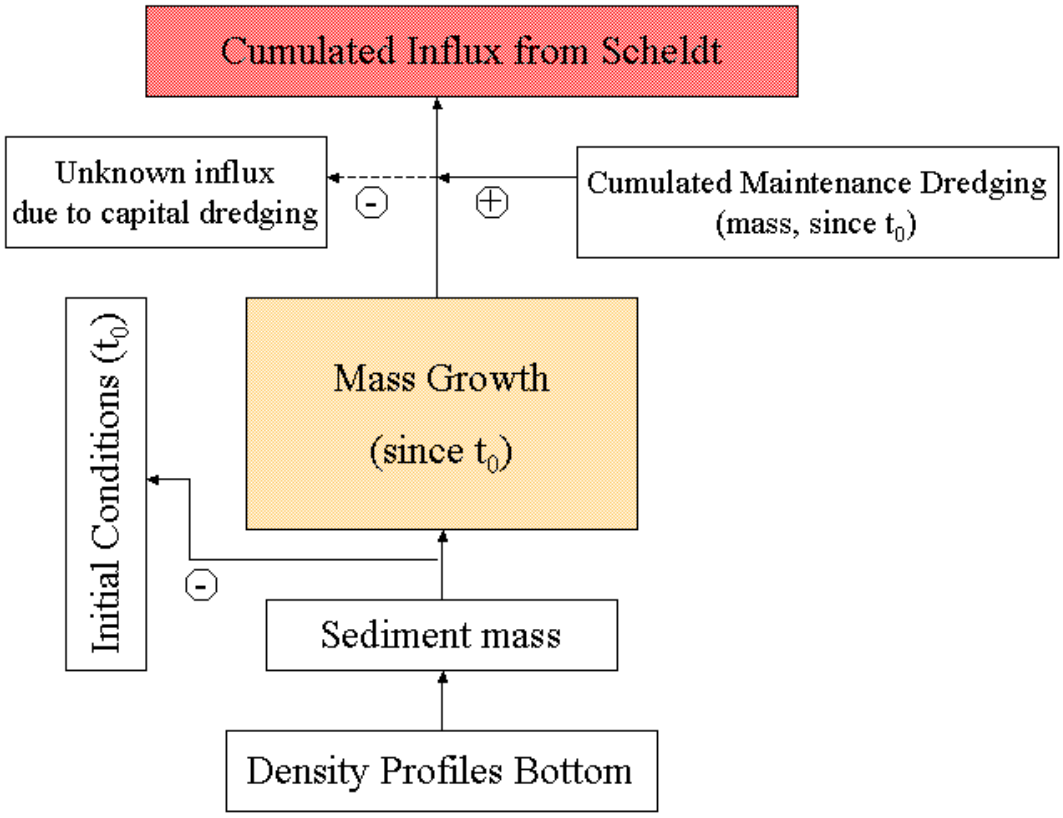



*Figure 2-2: Determining a sediment balance*

The main purpose of the second part of the study is to gain insight in the mechanisms causing siltation in Deurganckdok. The following mechanisms will be aimed at in this part of the study:

- Tidal prism, i.e. the extra volume in a water body due to high tide
- Vortex patterns due to passing tidal current
- Density currents due to salt gradient between the Scheldt river and the dock
- Density currents due to highly concentrated benthic suspensions

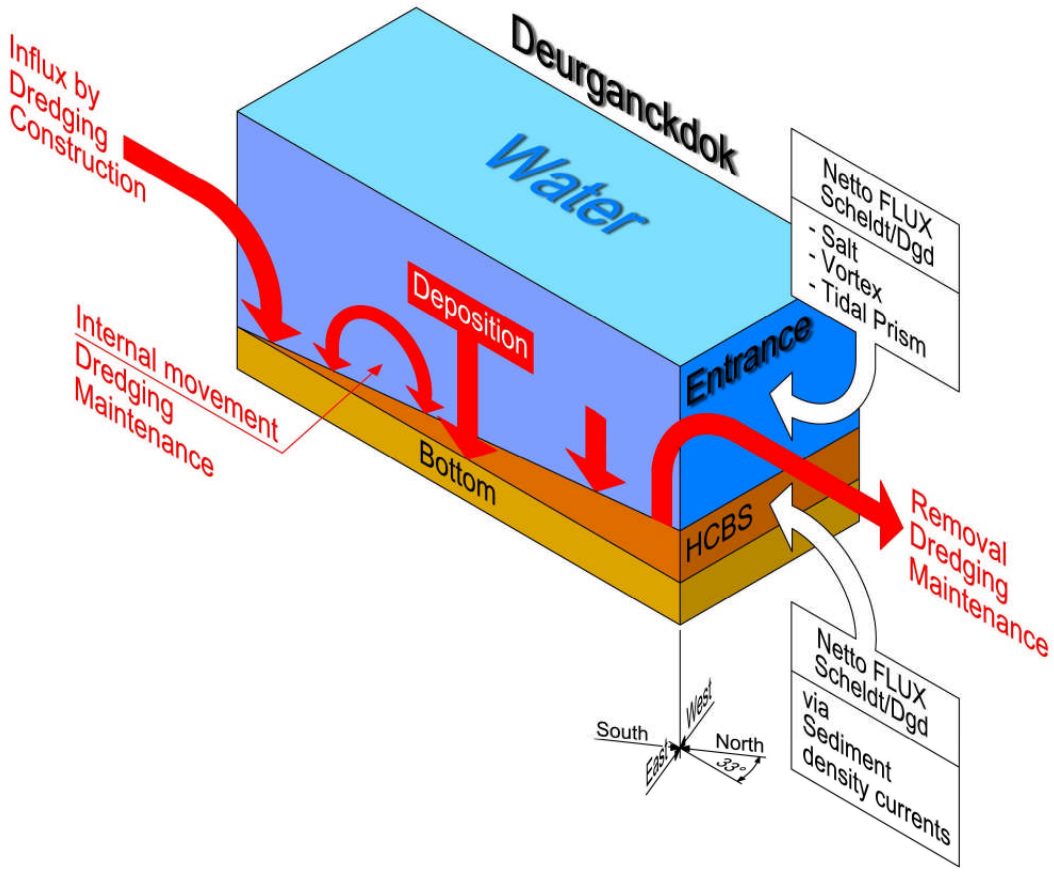



*Figure 2-3: Transport mechanisms*

These aspects of hydrodynamics and sediment transport have been landmark in determining the parameters to be measured during the project. Measurements will be focussed on three types of timescales: one tidal cycle, one neap-spring cycle and seasonal variation within one year.

Following data are being collected to understand these mechanisms:

- Monitoring the freshwater input (discharge) from the tributaries into the river Scheldt.
- Monitoring salinity and sediment concentration in the Lower Sea Scheldt at permanent measurement locations at Oosterweel, up- and downstream of the Deurganckdok.
- Long term measurement of salinity and suspended sediment distribution in Deurganckdok.
- Monitoring near-bed processes (current velocity, turbidity, and bed elevation variations) in the central trench in the dock, near the entrance as well as near the current deflecting wall location.
- Dynamic measurements of flow pattern, salinity and sediment transport at the entrance of Deurganckdok.
- Through tide measurements of vertical sediment concentration profiles -including near bed high concentrated benthic suspensions.
- Monitoring dredging activities at the entrance channels towards the Kallo, Zandvliet and Berendrecht locks as well as dredging and dumping activities in the Lower Sea Scheldt and Deurganckdok in particular.

In situ calibrations were conducted on several dates to calibrate all turbidity and conductivity sensors.

## 2.2. Description of the measurement campaign

### 2.2.1. Purpose of the measurement campaign

The purpose of the measurements was to determine the cross-section distribution of the suspended sediment concentration, sediment flux, flow velocity and water discharge over a sailed transect DGD during a complete tidal cycle. The final purpose is to make a water and a sediment balance from the river Scheldt at Deurganckdok during a tidal cycle by integrating the water discharge and sediment flux.

To get up a water and sediment balance at Deurganckdok, 3 transects were sailed during the same tidal cycle on the 11th of March at the river Scheldt (Figure 2-4): at the entrance of Deurganckdok (transect DGD), upstream of Deurganckdok (transect I) and downstream of Deurganckdok (transect K). This report focuses on the through tide measurements at the entrance of Deurganckdok (transect DGD) and the two others measurement campaigns are described in IMDC reports 2008i and 2008j.

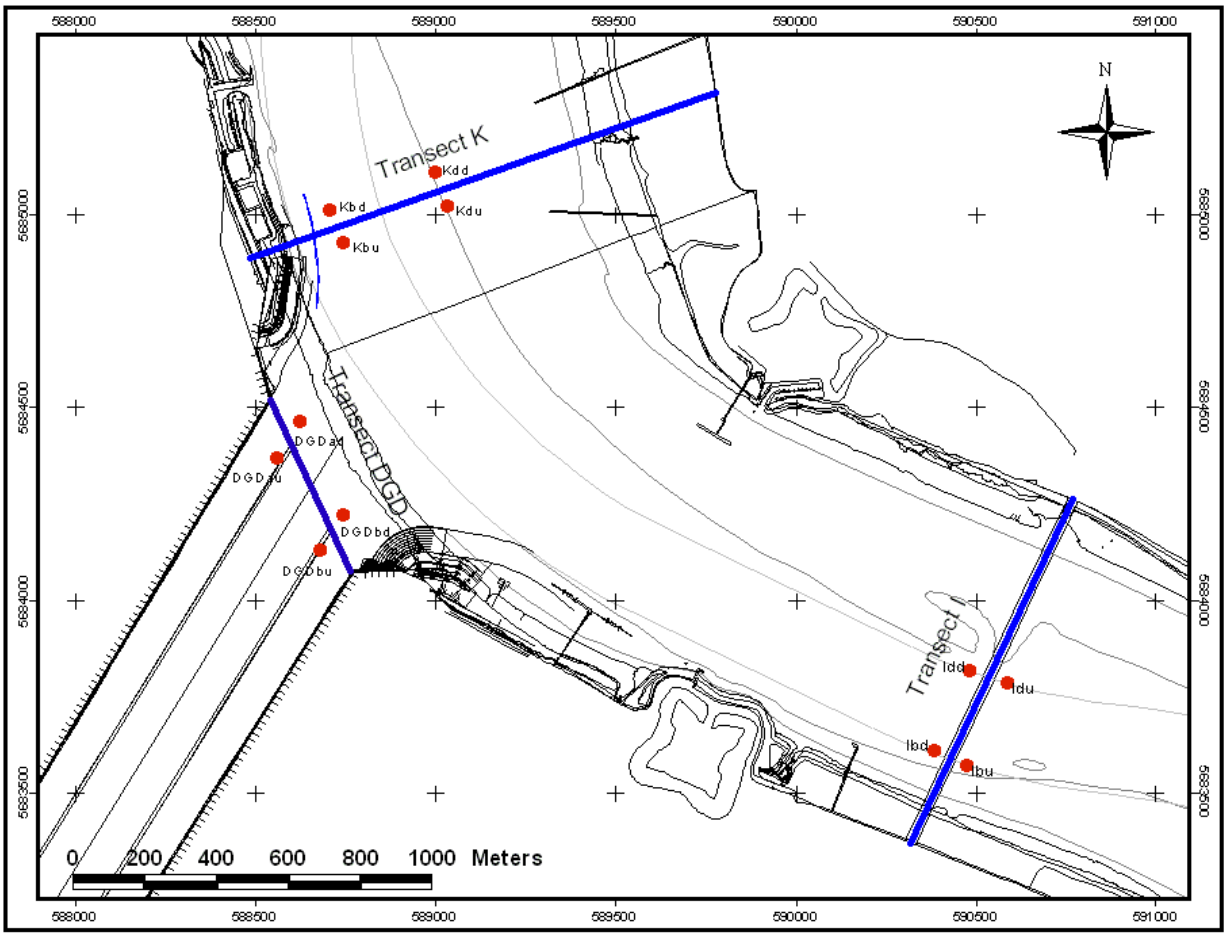



*Figure 2-4: Map of sailed transect and calibration points at Deurganckdok on 11th of March 2008*

### 2.2.2. Measurement procedure

Flow velocity, Turbidity, Salinity and Temperature measurements were conducted on the 11th of March from 7h00 MET until 20h00 MET. From the survey vessel Parel II a measurement cycle was completed every 30 minutes. The vessel with a mounted ADCP sailed a fixed transect from the right bank to the left bank and vice versa as a backup transect (Table 2-1). Profiles were gathered to calibrate the ADCP transects for temperature, salinity and suspended sediment concentration to be used in Sediview.

Two calibration profiles were collected for each transect (Table 2-2):

- One before sailing the transect at the bank where the start of the transect was
- One after sailing the transect at the bank where the transect ended

During these calibrations, a fish with a CTD-OBS was lowered to the bottom. The downcast was interrupted at three depths, one in the upper half of the water column (between 4 and 7 m from the water surface), one at 4 meters above the bottom and the last one at the water bottom. At the two first depths samples were taken for calibration, and are used as 'ground truth' for all suspended sediment concentration measurements (OBS and Sediview). The turbidity measurement at the third depth is used to estimate the SS concentration at the bottom (see 4.2.4.1.2). The other instruments logged continuously during the downcast. Conductivity, Temperature and Depth was logged by the CTD-probe, while turbidity was recorded by the OBS.

*Table 2-1:Transect of the Flow Measurements on 11th of March 2008 (UTM31 ED50)*

| ***Measurement location*** | ***Left Bank Easting*** | ***Left Bank Northing*** | ***Right Bank Easting*** | ***Right Bank Northing*** | ***Avg Length [m]*** | ***Avg Course [degr.]*** |
|---|---|---|---|---|---|---|
| Transect I | 590 318 | 5 683 302 | 590 771 | 5 684 557 | 1057 | 25 |
| Transect DGD | 588 541 | 5 684 527 | 588 765 | 5 684 056 | 521 | 335 |
| Transect K | 588 484 | 5 684 924 | 589 775 | 5 685 384 | 1371 | 70 |

*Table 2-2: Positions of the calibration points for 11th of March 2008 during flood and ebb.*

| ***Measurement point*** | ***Bank*** | ***Easting (UTM31 ED50)*** | ***Northing (UTM31 ED50)*** |
|---|---|---|---|
| ***Flood*** | | | |
| Ibu | Left | 590476 | 5683514 |
| Idu | Right | 590589 | 5683744 |
| DGDau | Left | 588561 | 5684369 |
| DGDbu | Right | 588682 | 5684113 |
| Kbu | Left | 588746 | 5684965 |
| Kdu | Right | 589033 | 5685066 |
| ***Ebb*** | | | |
| Ibd | Left | 590384 | 5683557 |
| Idd | Right | 590485 | 5683778 |
| DGDad | Left | 588623 | 5684470 |
| DGDbd | Right | 588745 | 5684214 |
| Kbd | Left | 588706 | 5685055 |
| Kdd | Right | 588999 | 5685160 |

## 2.3. The equipment

### 2.3.1. ADCP

The current measurements were conducted using an RD Instruments ADCP 600 kHz Workhorse. For positioning the GPS onboard the vessel Scheldewacht II was used. For the measurement of the heading a gyrocompass was installed.

This 600 KHz ADCP system was mounted on a steel pole underneath the central axis of the vessel. The transducer set was looking vertically downwards to the bottom. Transceiver unit and computer system were connected to peripherals such as the differential GPS-receiver, the heave compensator and the gyrocompass.

During the measurements the ADCP constantly measured upstream from the vessel. The acquisition software of Winriver was used. The main settings are given in Table 2-3.

*Table 2-3: Main Configuration Settings of ADCP*

| ***Main configuration settings of ADCP 600kHz Worhhorse:*** |
|---|
| Cell depth: 0.5 m |
| Number of cells: 50 |
| Number of Water pings per ensemble: 2 |
| Number of Bottom Track pings per ensemble: 2 |
| Time between ensembles: 0 |
| Averaging: None |
| Speed of Sound: Fixed 1500 m/s |
| Salinity 0 psu |
| 3-beam solution: enabled |

### 2.3.2. OBS - CTD

A D&A type OBS 3A was used to measure depth, conductivity, temperature and turbidity.

Measured parameters by the OBS 3A sensor: temperature (°C), conductivity (µS/cm), absolute pressure (m), turbidity (NTU).

On Parel II, the OBS 3A device was mounted on a tow fish. The resulting record is filled-up with GPS-time, sample number, and planimetric position of the GPS-receiver. Sampling frequency is 1 reading per second.

The technical details on the OBS 3A are given in the winter calibration Report of the HCBS 1 measurement campaign. (IMDC, 2006a)

### 2.3.3. Pump Sampler

A water sampler was attached nearby the turbidity sensor taking water samples. Samples were collected in 1 litre sampling bottles. The pumping speed of the water sampler was tested at the start of the measurement campaign on board. Dye was used to time the duration between the intake of the dye and exit at the sampling end of the sampler on board. The duration between intake and exit at the end was 30 seconds.

# 3. COURSE OF THE MEASUREMENTS

## 3.1. Measurement periods

At Deurganckdok ADCP tracks were sailed about every 15 minutes for 13 hours, in total 51 cross-sections.

Calibration profiles were taken at 2 locations (left bank, right bank). During every cycle, 1 calibration profile was taken serving as the second calibration of the previous transect and as the first calibration point of the current transect, resulting in a total of 52 profiles. APPENDIX A gives the start and end points of the tracks, the sailed length and the course.

## 3.2. Hydro-meteorological conditions during the measurement campaign

### 3.2.1. Vertical tide during the measurements

The vertical tide was measured at the Liefkenshoek tidal gauges. Graphs of the tide at Liefkenshoek on the 11th March of 2008 can be found in APPENDIX B. Table 3-1 gives the most important characteristics (high and low tide) of the tide at those gauges on the 11th of March 2008.

*Table 3-1: High and low tide at Liefkenshoek on 11/03/2008*

| ***Liefkenshoek Tidal Gauge*** | | |
|---|---|---|
| ***11 March 2008*** | | |
| | ***Time [MET]*** | ***Water level [m TAW]*** |
| **HW (1)** | 5:00 | 6.22 |
| **LW (2)** | 12:30 | 0.08 |
| **HW (3)** | 17:50 | 5.93 |

In Table 3-2 the tidal characteristics of the tide on the 11th of March 2008 are compared to the average tide over the decade 1991-2000 (AMT, 2003).

*Table 3-2: Comparison of the tidal characteristics of 11/03/2008 with the average tide, the average neap tide and the average spring tide over the decade 1991-2000 for Liefkenshoek.*

| | ***Neap tide (1991 - 2000)*** | ***Avg Tide (1991 - 2000)*** | ***Spring Tide (1991 - 2000)*** | ***Tide 11/03/2008*** |
|---|---|---|---|---|
| **Water level [m TAW]** | | | | |
| HW (1) | 4.63 | 5.19 | 5.63 | 6.22 |
| LW (2) | 0.39 | 0.05 | -0.18 | 0.08 |
| HW (3) | - | - | - | 5.93 |
| **Tidal difference [m]** | | | | |
| Falling (1 to 2) | 4.24 | 5.14 | 5.81 | 6.14 |
| Rising (2 to 3) | 4.24 | 5.14 | 5.81 | 5.85 |
| **Duration [hh:mm]** | | | | |
| Falling (1 to 2) | 6:40 | 6:50 | 7:02 | 7:30 |
| Rising (2 to 3) | 5:59 | 5:34 | 5:16 | 5:20 |
| Tide (1 to 3) | 12:39 | 12:24 | 12:18 | 12:50 |
| **Tidal coefficient** | | | | |
| Falling (1 to 2) | 0.82 | 1.00 | 1.13 | 1.19 |
| Rising (2 to 3) | 0.82 | 1.00 | 1.13 | 1.14 |

The tidal coefficients from 1.14 up to 1.19 for the measured tide of the 11$^{th}$ of March 2008 indicate that this tide has a larger tidal range than the average tide for the decade of 1991-2000, and can be classified as spring tide.

### 3.2.2. Meteorological data

Meteorological data at Deurne was obtained from the Weather Underground website (Wunderground, 2008).

The weather on the 11$^{th}$ of March 2008 was stormy and the wind blew from the west at an average velocity of 22 km/h with maximal gust velocity of 67 km/h. The air temperature varied between 5 and 12°C. The sky was cloudy with precipitation.

## 3.3. Navigation information

An overview of the navigation at the measurement location is given in APPENDIX C.

## 3.4. Remarks on data

Shipwakes were removed from the data where possible. Transect 3095 was excluded for processing because too many boats interfered.

# 4. PROCESSING OF DATASETS

## 4.1. Calibration of the OBS turbidity sensor

A crucial aspect of the accuracy and reliability of the data concerns the calibration of the OBS turbidity sensor. The calibration of the OBS sensor is necessary to convert turbidity into Suspended Sediment Concentration (SSC). We use here an in situ calibration, which is more representative of the actual measurement conditions at that moment. At some depths water samples were taken by the pump sampler and were analysed by a laboratory for SSC. These SSC were used as 'ground truth' to calibrate the OBS turbidity sensor. The calibration curve can be found in APPENDIX D.

## 4.2. Methodology of processing of the ADCP data with Sediview

DRL Software's Sediview was used to process the ADCP data. Sediview is designed to derive estimates of suspended sediment concentration throughout the water column using acoustic backscatter data obtained by ADCPs manufactured by RD Instruments of San Diego, California.

### 4.2.1. Acoustic backscatter theory

The acoustic theory governing backscatter from particles suspended in the water column is complex, but the following simplified formula serves to introduce the main factors that are relevant:

$$E = SL + SV + Constant - 20\log(R) - 2\alpha_w R$$

Where:

- $E$ = echo intensity,
- $SL$ = transmitted power,
- SV = backscatter intensity due to the particles suspended in the water column,
- $\alpha_w$ = a coefficient describing the absorption of energy by the water,
- $R$ = the distance from the transducer to the measurement bin.

The term 20log(R) is a simple geometric function which accounts for the spherical spreading of the beam. The constant is required because each ADCP has specific performance characteristics.

In order to measure the suspended sediment concentration in the water column it is necessary to relate the backscattered sound intensity to the mass concentration in the water. For the purposes of measuring solids concentration on site, it can be shown that the relationship is as follows (derived from Thorne and Campbell, 1992 and Hay, 1991 in DRL (2003)):

$$Log_{10}M_r = \{dB + 2r(\alpha_w + \alpha_s) - K_s\}S^{-1}$$

Where:

- $M(r)$ = mass concentration per unit volume at range, $r$
- $S$ = relative backscatter coefficient
- $K_s$ = site and instrument constant
- $dB$ = the measured relative backscatter intensity (corrected for beam spreading)
- $\alpha_w$ = water attenuation coefficient
- $\alpha_s$ = sediment attenuation coefficient, which is a function of the effective particle size

In this expression there are four unknowns: *S*, *Ks*, $\alpha_w$ and $\alpha_s$. These parameters are to be determined within Sediview (APPENDIX F).

### 4.2.2. Water sampling and transect sailing

To calibrate Sediview for suspended sediment concentration, two water samples are taken at the beginning and at the end of each transect (see 3.1). Both samples are taken within the range of reliable data of the ADCP. For the near-surface sample this means in bin 3 or 4, for the near-bed sample this means at about one or two meter above the sidelobe.

Water sampling is done together with CTD-OBS measurement in order to have two independent suspended sediment concentration measurements for each sample. OBS measurements were compared to the water samples and recalibrated as mentioned in § 4.1. The water samples were used for Sediview calibration, while cross-calibrated OBS measurements were used as a back up check. The salinity and temperature was used to compute the acoustic water absorption (water attenuation coefficient). All water samples were analysed as is described in 4.2.3.1.

### 4.2.3. Calibration for suspended sediment concentration within Sediview

#### *4.2.3.1. Calibration workset*

The calibration workset consists of ADCP-files, sampling times, sampling depths, SSC obtained from water samples and SSC, temperature and salinity obtained from CTD-OBS readings.

The suspended sediment concentration of the water samples was determined. One-litre samples were filtered over a preweighed desiccated 0.45 micron filter, after which the filter is dried in an oven at 105°C, cooled and weighted (NEN 6484).

#### *4.2.3.2. SSC calibration per ensemble pair*

In the Sediview calibration process the following parameters must be defined: the site and instrument constant (Ks), the relative backscatter coefficient (S) and the effective particle size per ensemble-pair (near-surface sample and near-bed sample) in order to fit the Sediview-estimate with the suspended sediment concentration of the water samples. These parameter sets may not differ too much from the previous parameter sets, as the environmental conditions will not change that much over a small time interval. To obtain a smooth progress in time of Ks, S and effective particle size an iterative approach is used.

### 4.2.4. Sediview configuration

#### *4.2.4.1. Discharge and suspended sediment concentration estimates*

The ADCP measures most of the water column from just in front of the ADCP to 6% above the bottom. The shallow layer of water near the bottom is not used to compute discharge and suspended sediment concentration due to side-lobe interference. When the ADCP sends out an acoustic pulse, a small amount of energy is transmitted in side lobes rather than in the direction of the ADCP beam. Side lobe reflection from the bottom can interfere with the water echoes and can give erroneous data. The thickness of the side lobe layer is 6% of the distance from the transducers to the bottom.

Near the banks the water depth is too shallow for the ADCP to profile.

For each of those unmeasured regions, Sediview will make an estimate of the discharges and suspended sediment concentration. The measured and unmeasured regions in the cross section are shown in Figure 4-1 and Figure 4-2.

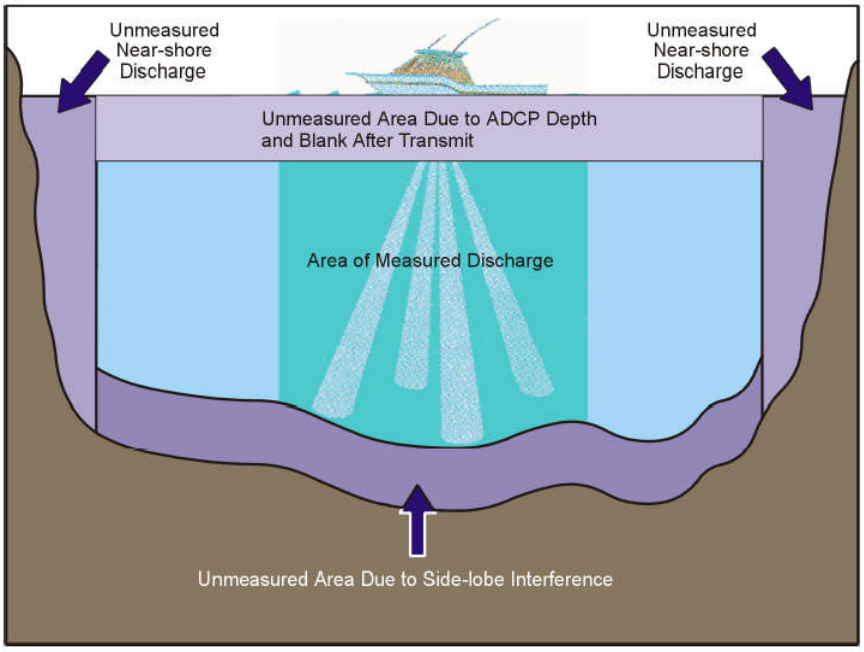



*Figure 4-1: Unmeasured regions in the cross section (from RD Instruments, 2003)*

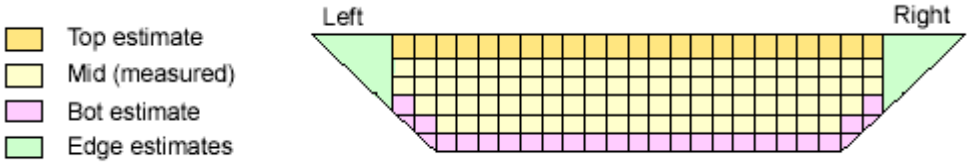



*Figure 4-2: Measured and estimated discharges and sediment fluxes within Sediview (DRL, 2005)*

#### 4.2.4.1.1 Top/bottom estimates

The sediment concentration and discharge at the top of the water column is assumed to be the same as the concentration and discharge in the first measured bin.

The sediment concentration between the bottom and the lowest valid bin is assumed to be an increase of the lowest valid bin. The SSC increase between the lowest valid bin (position of the sidelobe) and the bottom is calculated from the CTD-OBS profile, which was lowered in the unmeasured sidelobe layer. The CTD-OBS profiles show that the bottom value of the SSC at the calibration points transect I vary during a tidal cycle between approximately 99 and 194% of the SSC-value at the position of the sidelobe. As the concentration grows approximately linear from the lowest valid bin to the bottom, and as Sediview uses a constant concentration factor for these deepest bins, we use a concentration factor that varies between 100 and 147% (Figure 4-3). An overview of the used power concentration factor is given in APPENDIX F.

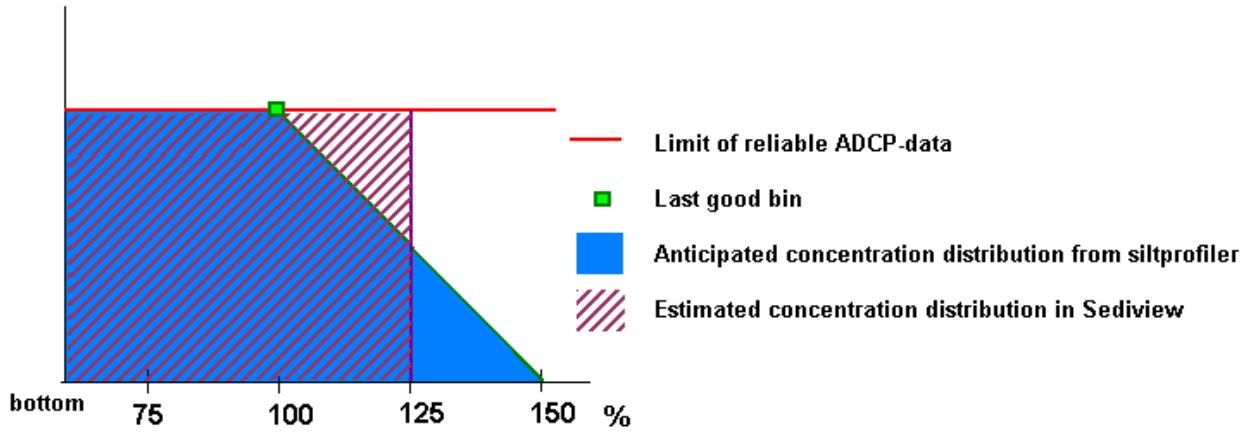



*Figure 4-3: Principal of bottom estimate of the sediment concentration in Sediview*

*Table 4-1: Extrapolation methods for top and bottom variables*

| ***Variable*** | ***Top*** | ***Bottom*** |
|---|---|---|
| Discharge Method | Constant | Power |
| Concentration factor | 100% | 100-147% |

The discharge for the bottom water layer is estimated by using the power method. Chen (1991) discusses the theory of power laws for flow resistance. Simpson and Oltmann (1990) discuss Chen's power law equivalent of Manning's formula for open channels (with b=1/6) (RD Instruments, 2003).

$$u / u* = 9.5(z / z_0)^b$$

Where:

- z = Distance to the channel bed [m]
- u = Velocity at distance z from bed [m/s]
- u* = Shear velocity [m/s]
- $z_0$ = Bottom roughness height [m]
- b = Exponent (1/6)

#### 4.2.4.1.2 Edge estimates

The shape of the edges of the cross section is assumed to be near triangular due to the banks of the river Scheldt. Five data ensembles are to be averaged to determine the left and right bank mean velocities used for calculation of edge estimates.

The distance from start- and endpoint to the bank is calculated from the theoretical start- and endpoint at the bank to the effective start- and endpoint. The theoretical points are taken at the banks.

*Table 4-2: Reference points at the end of the mud flats on left and right bank*

| ***Coordinates (UTM31 ED50)*** | ***Easting Left bank*** | ***Northing Left bank*** | ***Easting Right bank*** | ***Northing Right bank*** |
|---|---|---|---|---|
| Transect DGD | 588 541 | 5 684 527 | 588 765 | 5 684 056 |

The formula for determining the near shore discharge is:

$$Q_{shore} = CV_m Ld_m \text{ [m}^3\text{/s]}$$

Where:

C = Coefficient (0.35 for triangular, 0.91 for rectangular shape)

$V_m$ = Mean water velocity in the first or the last segment [m/s]

L = Distance from the shore to the first or the last segment specified by the user [m]

$d_m$ = Depth of the first or the last segment [m]

The coefficient (C) has been set to 0.91 (triangular shape of the banks).

#### *4.2.4.2. Contour plots of the transects*

All contour plots show perpendicular and parallel projected values on the straightened sailed transects. The heading of the straightened sailed transect is defined by picking 2 points in the straight part of the line after having corrected the heading of the ADCP compass. The compass offset is derived from a comparison of the ADCPs bottom track with the external GPS data.

### 4.2.5. Output

General transect information containing start-stop coordinates of each sailed transects with stop time, track length and heading is given in APPENDIX A.

In APPENDIX G, four contourplots were generated for each transect showing the distribution of suspended sediment concentration & sediment flux as well as the flow velocity perpendicular and parallel to the transect. The following conventions were used:

- Distances on the X-axis were referenced to the starting point of the transect, the start of the sailed transect is always at distance equal to zero.
- Left bank is always shown left, right bank on the right side. For transect DGD, left bank was taken to be the western quay wall and the right bank to be the eastern quay wall considering the dock as being a tributuary to the Scheldt river.
- Perpendicular flow velocities and fluxes are positive for downstream flow (ebb, out of Deurganckdok), negative for upstream flow (flood, inbound).
- Parallel flow velocities are positive for flow going from the left bank to the right bank, and negative for flow going from the right bank to the left bank.
- Absolute Depth is given in meters above TAW.

Also a depth-averaged velocity plot was generated for the flow velocity perpendicular to the transect. (see APPENDIX G).

Tables in APPENDIX H give the values for discharges and sediment fluxes for the total cross-section and the average measured SSC is shown in APPENDIX I.

- Mid = measured part of the cross-section

- Top = top part of the cross-section
- Bottom = bottom part underneath the sidelobe
- Edge (left, right) = edge estimates to left & right bank
- Total = Mid+Top+Bottom+ Edge values

The graph in APPENDIX J gives the temporal variation of the total flux, total discharge and total measured SSC for the whole through tide measurement at Deurganckdok.

# 5. PRELIMINARY ANALYSIS OF THE DATA

## 5.1. March 11th 2008 survey

As Deurganckdok is situated along the part of the Scheldt river under tidal influence, it is subject to complex current fields near its entrance. The measured current field shows a vortex pattern depending on the tidal phase. During ebbing tide the vortex at the entrance of the dock is a counter-clockwise one and during rising tide it is a clockwise one. This is shown in the contour plots by inflow (negative) on the western side (left) and outflow on the eastern side of the entrance during ebbing tide and vice versa for flooding tide. (APPENDIX G).

During slack water we see a current field with opposing current directions in the upper part of the water column compared to the lower part of the water column. For high water we see inflow (negative) near the bottom and outflow (positive) near the surface. This particular pattern is probably an example of the expected salt density currents occurring near the entrance of Deurganckdok. The same event is seen at low water when the dock contains waters of higher salinity than the river; here we see an outflow near the bottom and inflow near the surface.

From the backscatter interpretation into suspended sediment concentration we see in general a higher concentration during slack water and during rising tide compared to during ebb tide.

Considering the sediment fluxes APPENDIX J shows that incoming transport is dominating during flood while a residual outgoing sediment transport can be observed from HW until the end of the measurement.

It appears from the recorded data that the highest water velocities occur near the navigation channel at about 1 hour before HW in which velocities exceed 1 m/s. The total calculated discharge ranges between 19 and 931 $m^3/s$.

The depth-averaged suspended sediment concentrations range from 41 mg/l up to 166 mg/l. The highest SS concentrations occur about 1h00 after HW.

The maximum calculated flux during ebb occurs 1h10 after HW and is about 107 kg/s. During flood, the highest flux is about -110 kg/s, 4h40 before HW.

## 5.2. Intercomparison with earlier surveys on November 17th 2005, March 22nd 2006, September 27th 2006 and October 24th 2007

On November 17th 2005 (HCBS1), March 22nd 2006 (HCBS2 winter), September 27th 2006 (HCBS2 summer) and October 24th 2007 (DGD1) the same transect has been sailed during through tide measurements, a description is given by IMDC (2005), IMDC (2006c), IMDC (2006d) and (2008a). Conditions near the entrance of Deurganckdok have been simulated in Delft3D and processed by IMDC (2006g) in order to compare simulation with observed data.

In order to make a comparison possible all results were referred to HW. The previous HCBS-campaigns (HCBS1 & HCBS2-winter) show a comparable tidal amplitude (tidal coefficients about 0.75) corresponding to neap tide. The HCBS2-summer campaign (27/09/2006) and DGD1 campaign (24/10/2007) on the other hand, have a comparable tidal coefficient of about 1.02 and is more corresponding to an average tide. The current campaign has a tidal coefficient of 1.14-1.19, which is higher than the average spring tide (Table 3-2).

It is important to underline that lower fresh water discharges from the tributaries were recorded during the measurement campaigns (Figure 5-1, Figure 5-2, Figure 5-3 and Figure 5-4): on 17/11/2005 and 22/03/2006 the discharges prior to the measurements were about 90 m³/s; on 27/09/2006 about 30 m³/s, on 24/10/2007 about 45 m³/s and on 11/03/2008 about 285 m³/s.

The results presented in Figure 5-6 are based on a long-term simulation over a period of 30 year (1971-2000) with the SIGMA-model for MKBA (IMDC, 2006g). The mean discharge is the annual average ten days' discharge, calculated with simulated long-term measurements. The high and low discharges are also annual ten days' discharges, and are calculated as mean discharge +2σ and mean discharge -2σ.

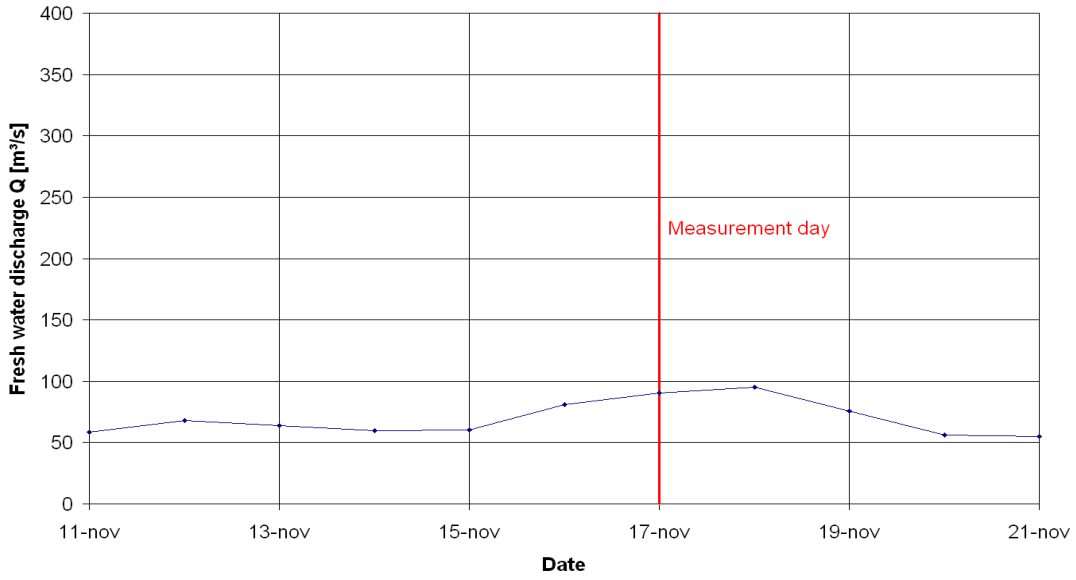



*Figure 5-1: Fresh water discharge 11 – 21 November of 2005.*

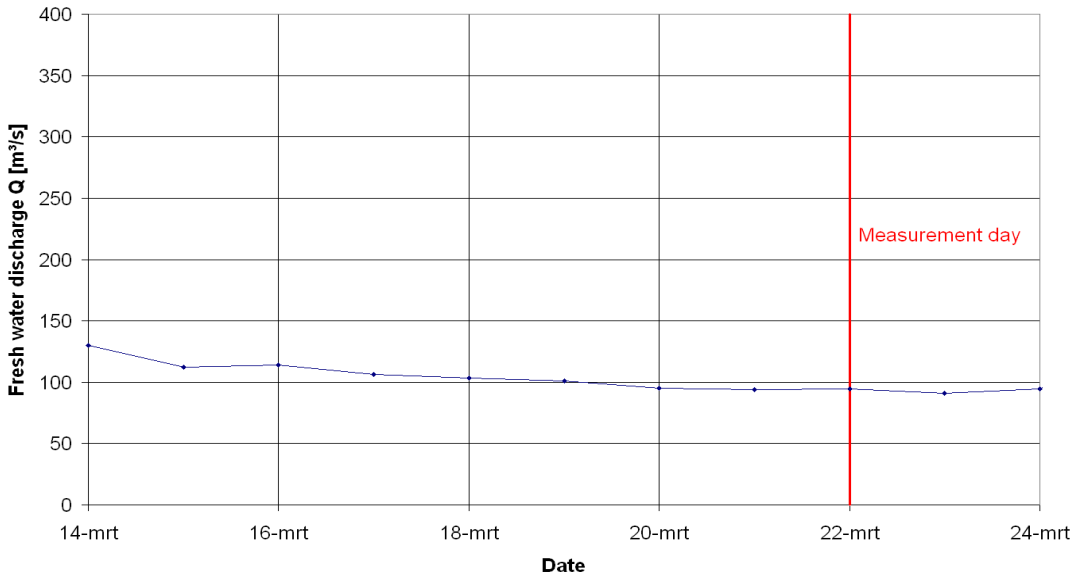



*Figure 5-2: Fresh water discharge 14 – 24 March of 2006*

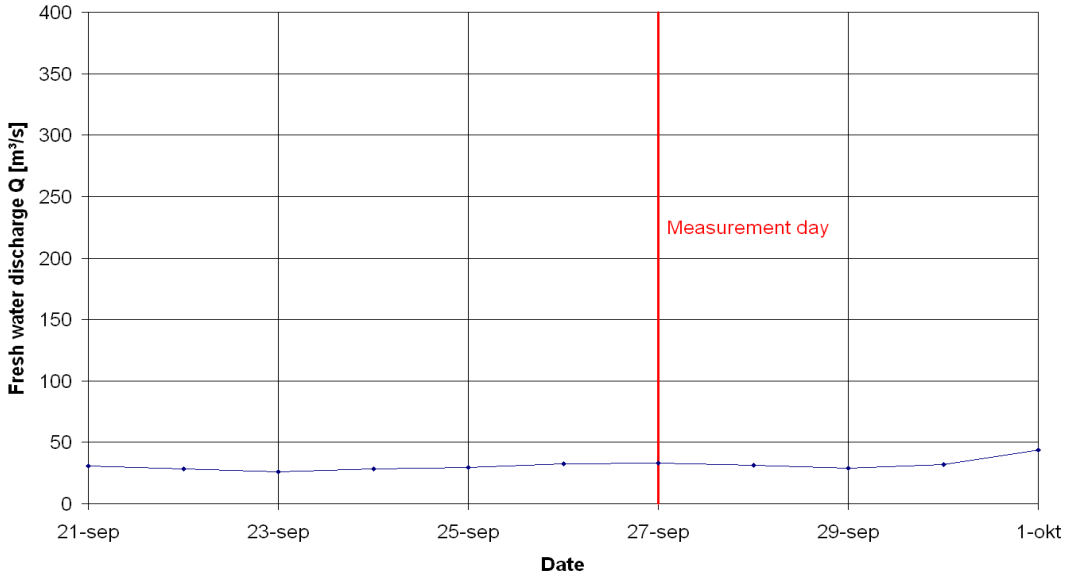



*Figure 5-3: Fresh water discharge 21 September – 1 October of 2006*

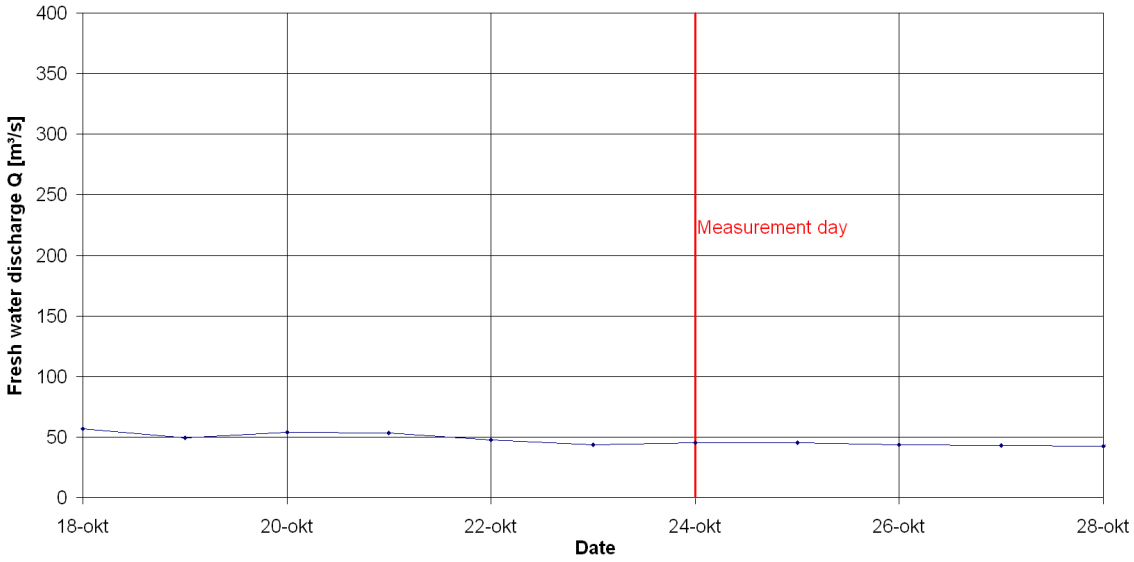



*Figure 5-4: Fresh water discharge 18 October – 28 October of 2007*

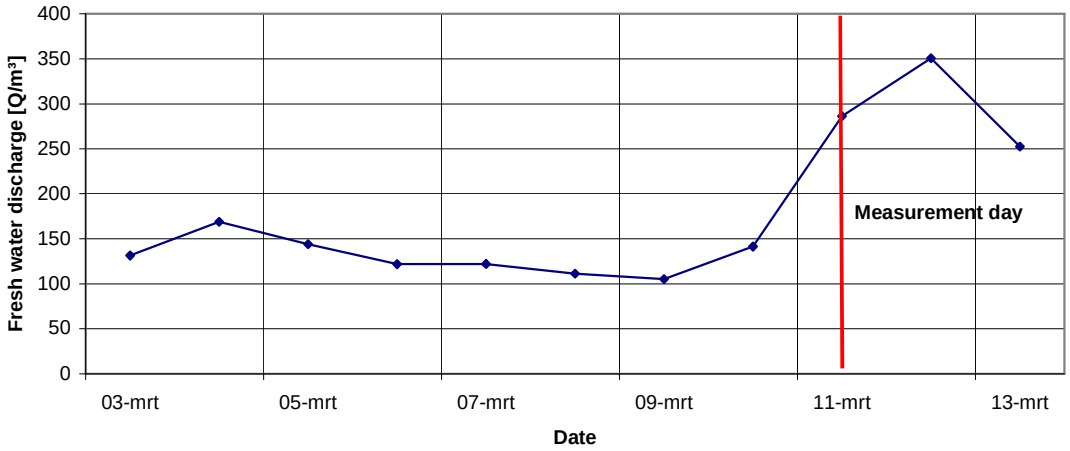



*Figure 5-5: Fresh water discharge 3 March - 13 March of 2008*

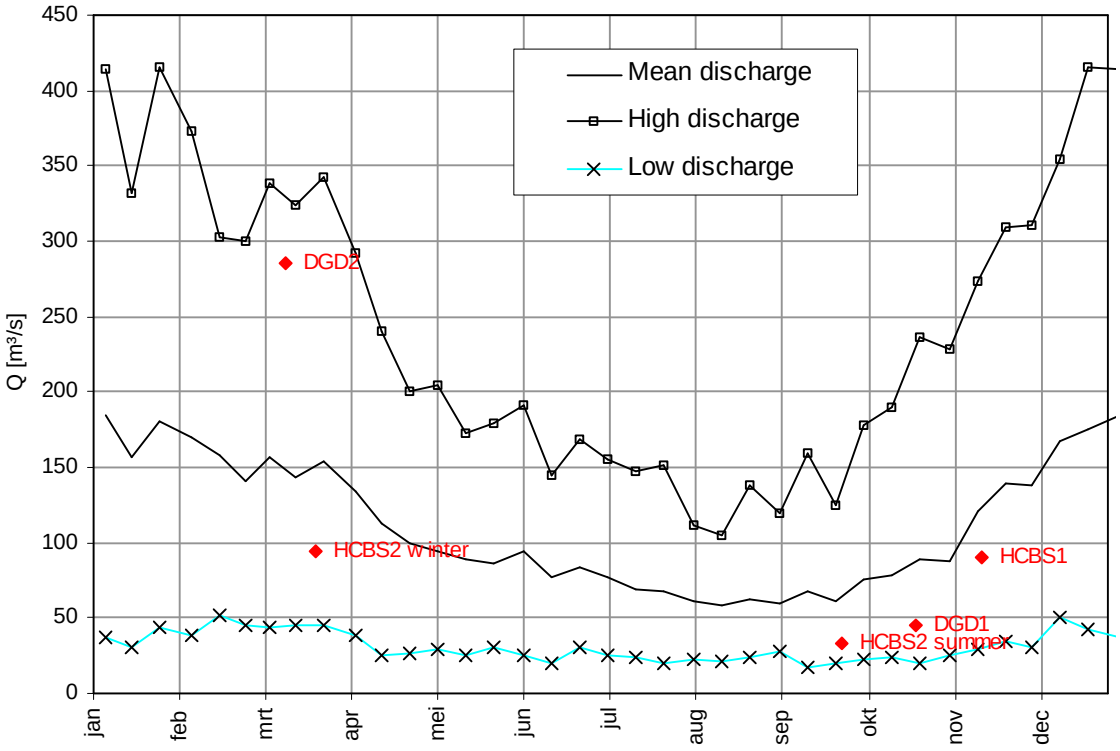
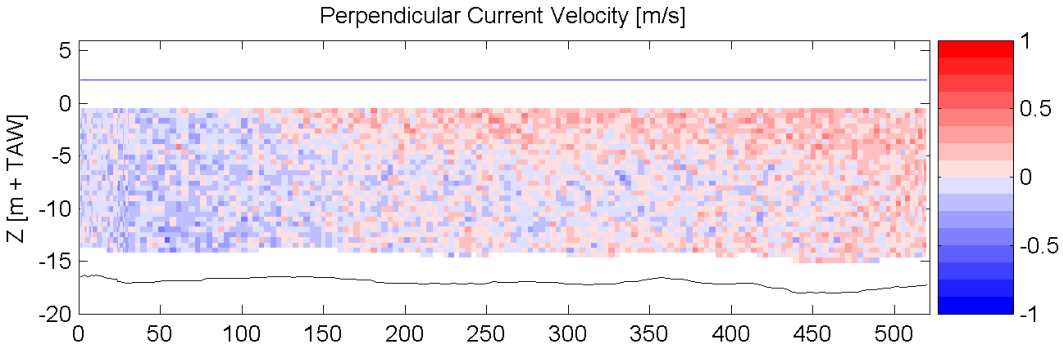



*Figure 5-6: Mean fresh water discharge*

The same circulation pattern as described above is found to have occurred at those days. In Figure 5-7 and Figure 5-8 the five measurements have been compared for about 3h after high water. Sediment distribution as well as current pattern in the cross section are almost identical for the former campaigns whereas the current flow shows higher sediment distribution The western side of the dock is situated at the left of these figures, the eastern side at the right.

In Figure 5-9 and Figure 5-10 the circulation pattern and sediment concentration have been compared for the same days but at about 1h after high water. Again the current pattern is almost identical on both days with a salt wedge intruding near the bottom of the dock and compensatory outflow of fresher water near the surface.

a)


Perpendicular Current Velocity [m/s]
Z [m + TAW]
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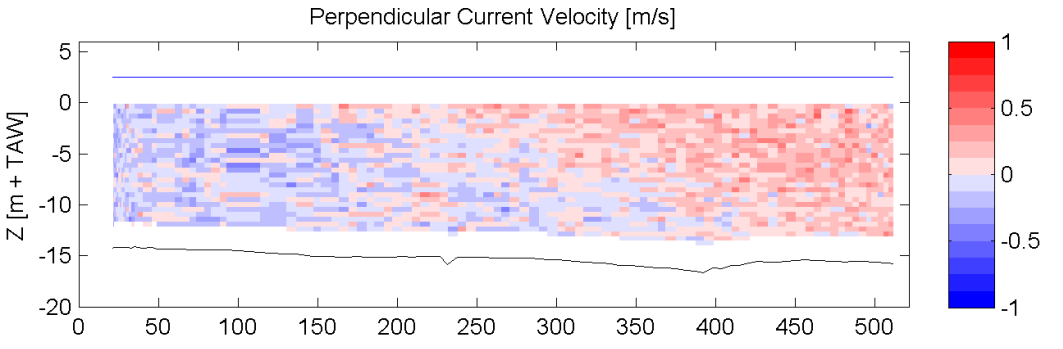
b)


Perpendicular Current Velocity [m/s]
Z [m + TAW]
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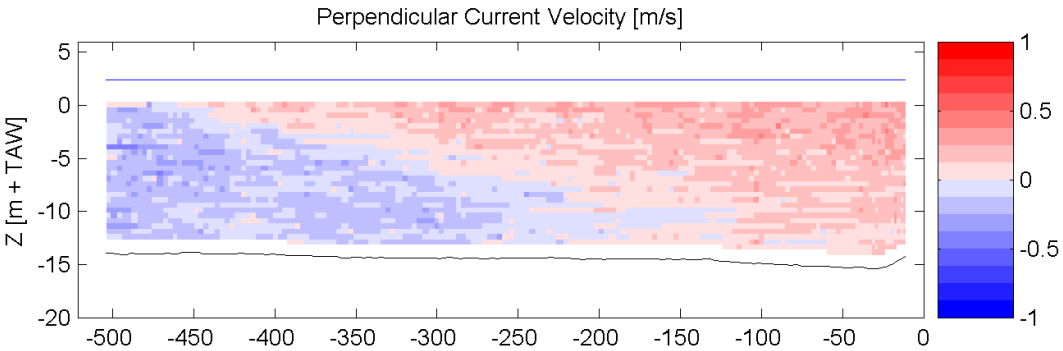
c)


Perpendicular Current Velocity [m/s]
Z [m + TAW]
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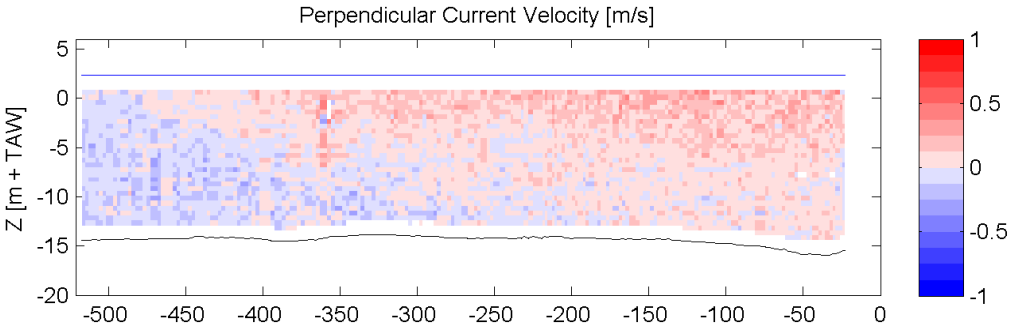
d)


Perpendicular Current Velocity [m/s]
Z [m + TAW]
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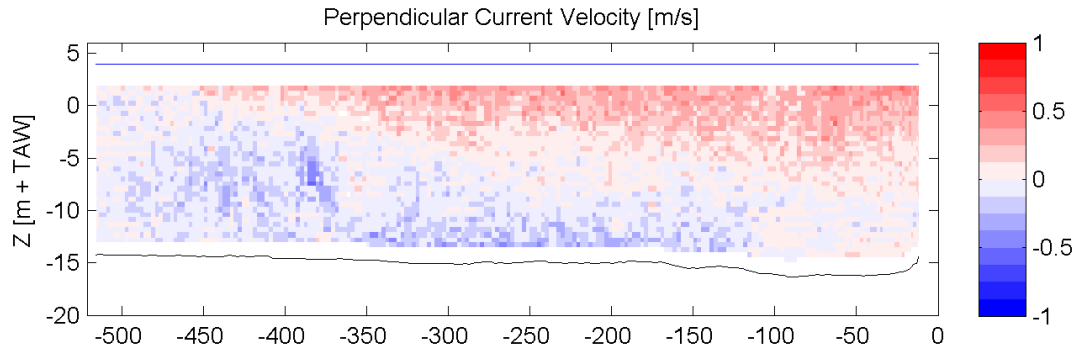
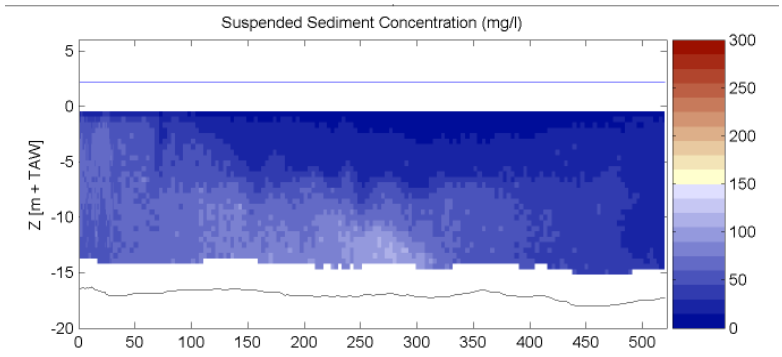
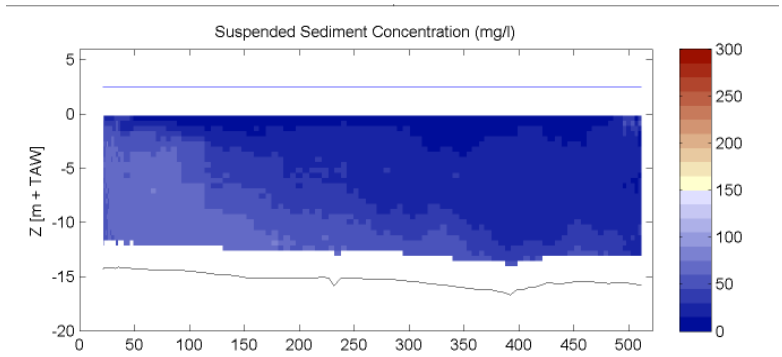



e)

*Figure 5-7: a) Perpendicular current velocity on 17/11/2005, b) on 22/03/2006, c) on 27/09/2006, d) on 24/10/2007 and e) on 11/03/2008 at 3h after high water*

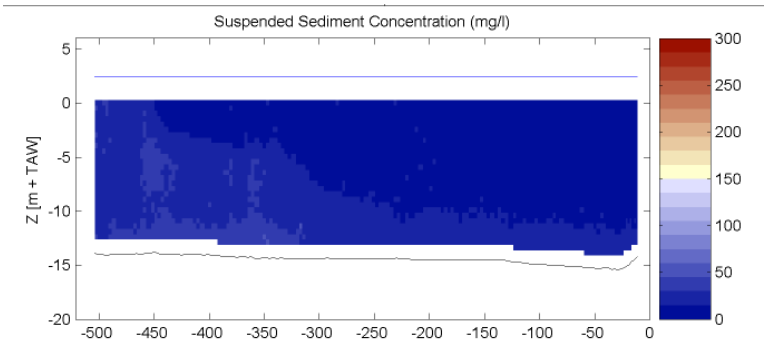



a)




b)

c)

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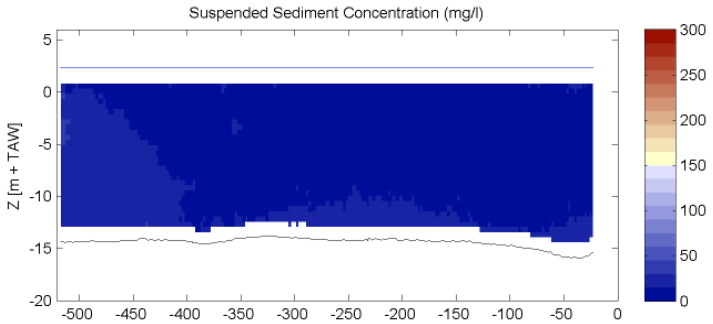



e)

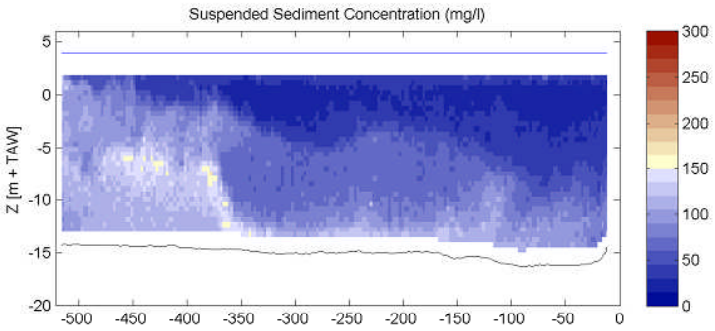
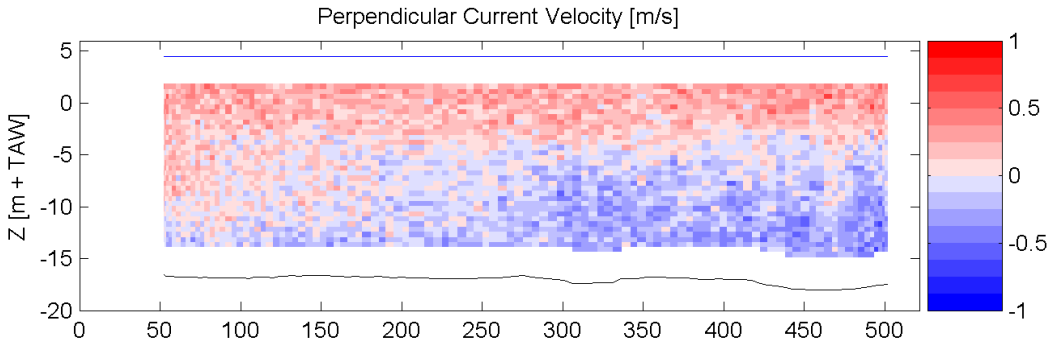
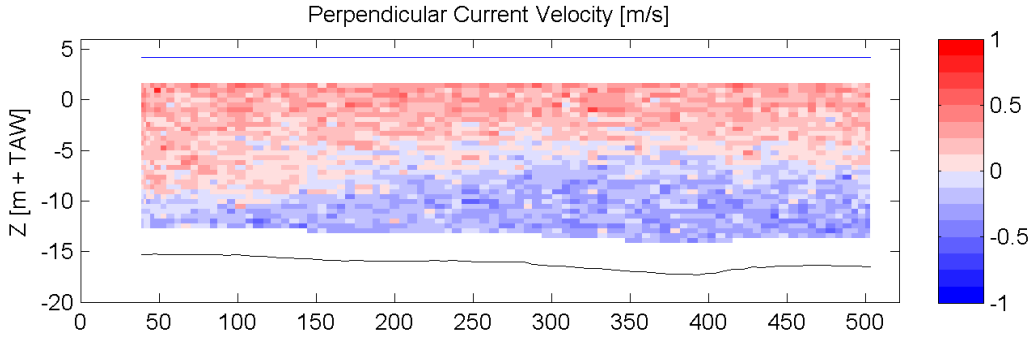



*Figure 5-8: a) Suspended sediment concentration on 17/11/2005, b) on 22/03/2006, c) on 27/09/2006, d) on 24/10/2007 and e) on 11/03/2008 at 3h after high water*

a)



b)


Perpendicular Current Velocity [m/s]
Z [m + TAW]
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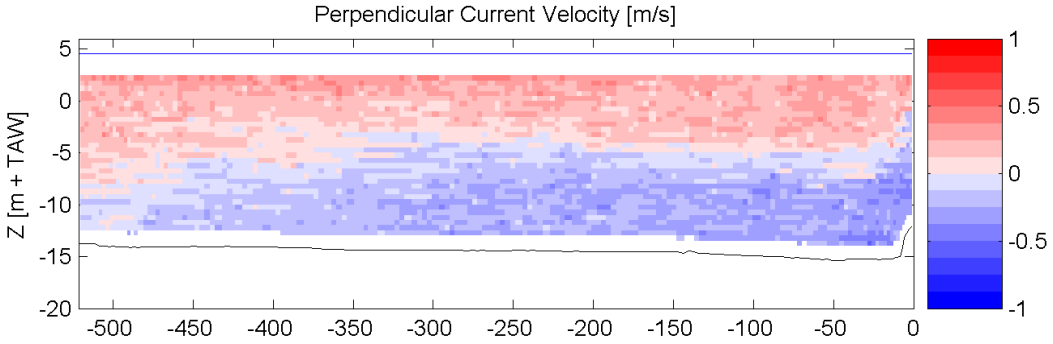
c)


Perpendicular Current Velocity [m/s]
Z [m + TAW]
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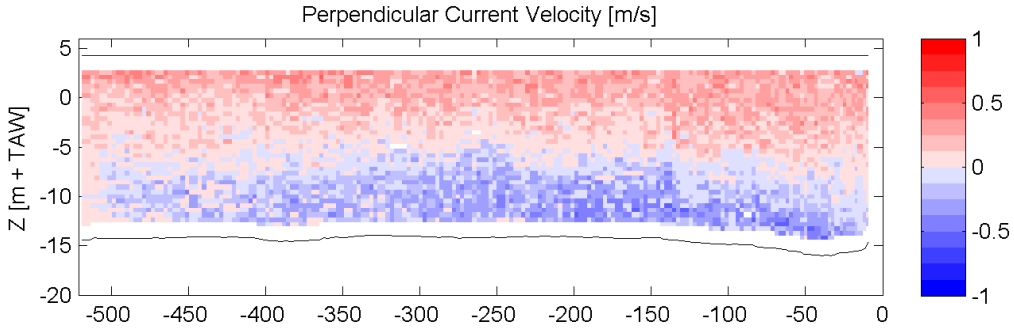
d)


Perpendicular Current Velocity [m/s]
Z [m + TAW]
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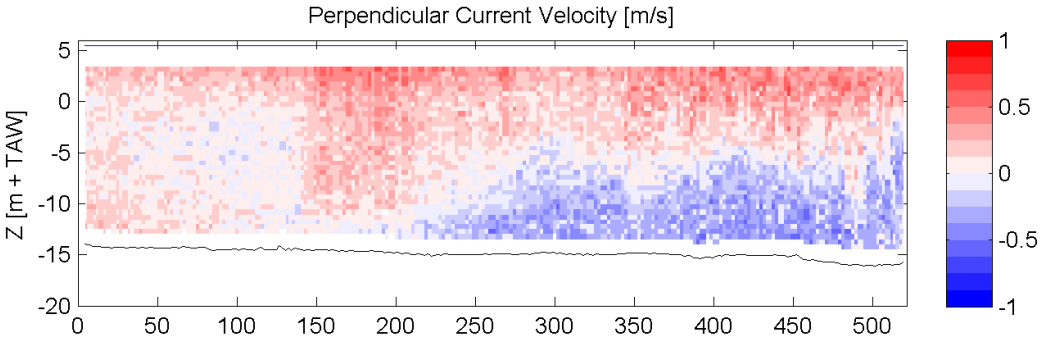
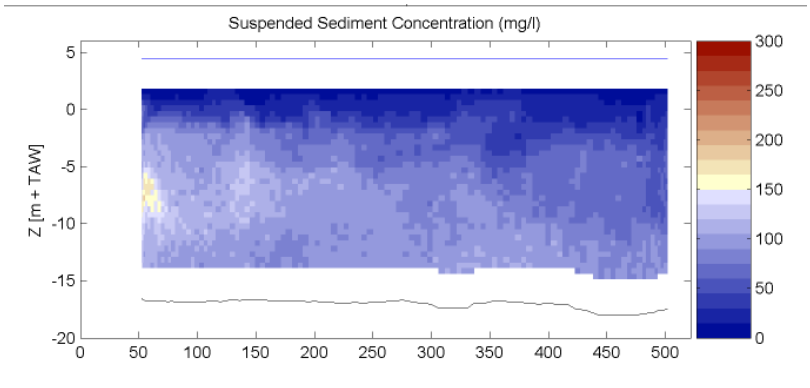
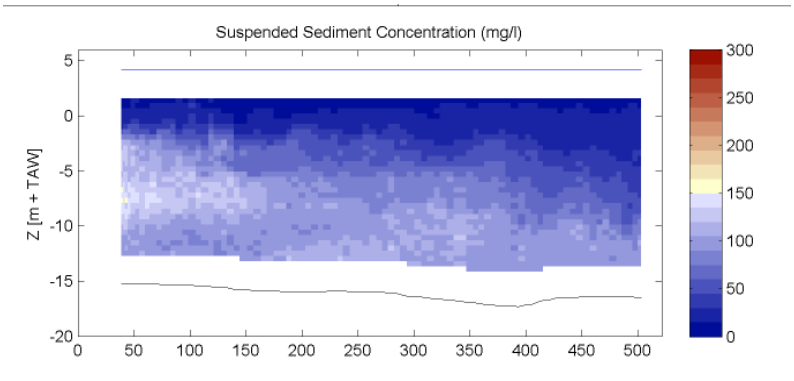



e)

*Figure 5-9: a) Perpendicular current velocity on 17/11/2005, b) on 22/03/2006 , c) on 27/09/2006, d) on 24/10/2007 and e) on 11/03/2008 at 1h after high water*




a)




b)

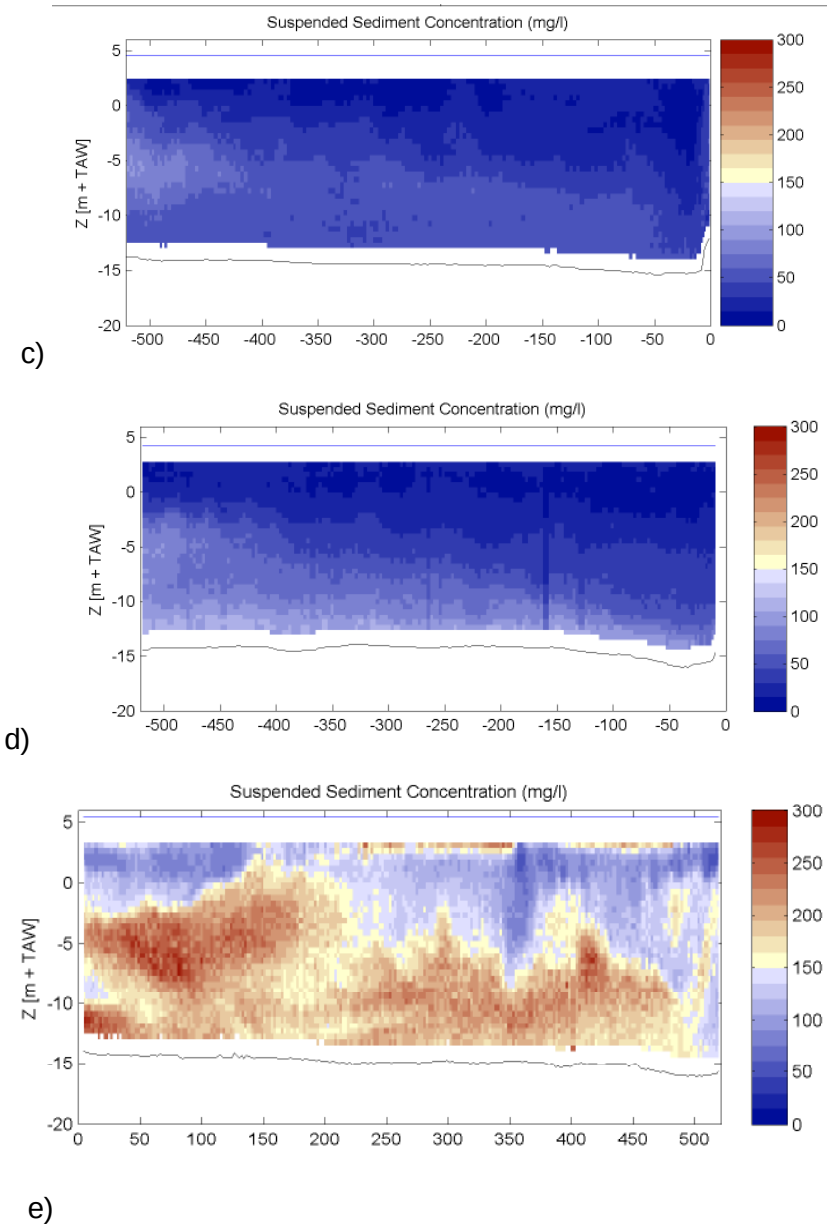



*Figure 5-10: a) Suspended sediment concentration on 17/11/2005, b) on 22/03/2006 , c) on 27/09/2006, d) on 24/10/2007 and e) on 11/03/2008 at 1h after high water*

The volume of water, crossing the dock's entrance during flood or ebb on a measurement day, was calculated by integrating the discharge curve during flood and ebb respectively. (Figure 5-11) and (Table 5-1) show the results. During flood on the 11$^{th}$ of March 2008, 5 642 000m³ water crossed the entrance and during ebb 11 872 000 m³. Comparing to the other campaigns, the volume during ebb is a lot higher and during flood rather average. The (Table 5-1) shows also the theoretical expected estimates of the volume during ebb and flood, which is result of a multiplication of area of Deurganckdok and tidal difference. The expected volume of water during ebb is smaller than the calculated water volume and during flood the expected volume is more or less equal to the calculated volume. The differences mean that the calculated values during ebb are probably an overestimation of the reality.

The mass of the suspended sediment, crossing dock's entrance during flood or ebb on a measurement day, was calculated on a similar manner as the volume. The flux curve was integrated (Figure 5-12) and (Table 5-2) show the results. During ebb on the 11th of March 2008, 655 tonnes SS crossed the entrance and during flood 1163 tonnes. 508 tonnes SS was deposited in the dock during the tidal cycle. Comparing with other campaigns, 508 tonnes are a high average (Table 5-2). Since flux is calculated with discharge and SS concentration, a similar overestimation and underestimation as the water volumes will achieve in the calculated SS masses.

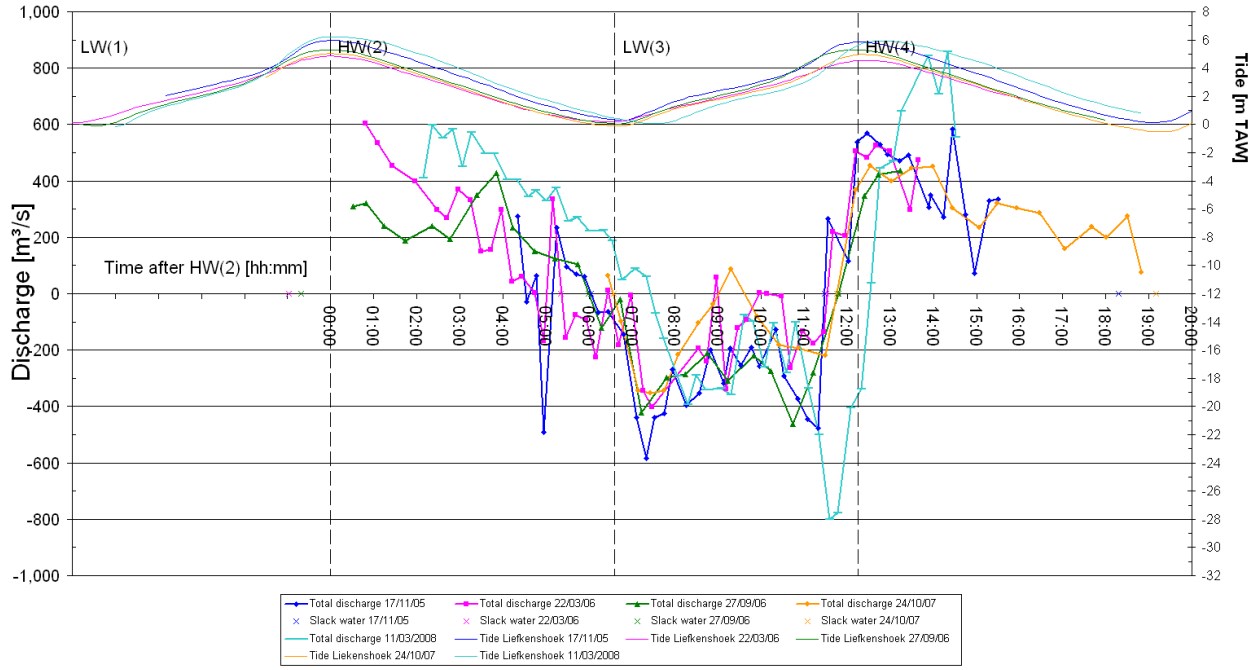



*Figure 5-11: Total discharge on 17/02/2005 (Neap tide), 22/03/2006 (Neap tide), 27/09/2006 (Average tide, 24/10/2007 (Average tide) & 11/03/2008 (Spring tide)*

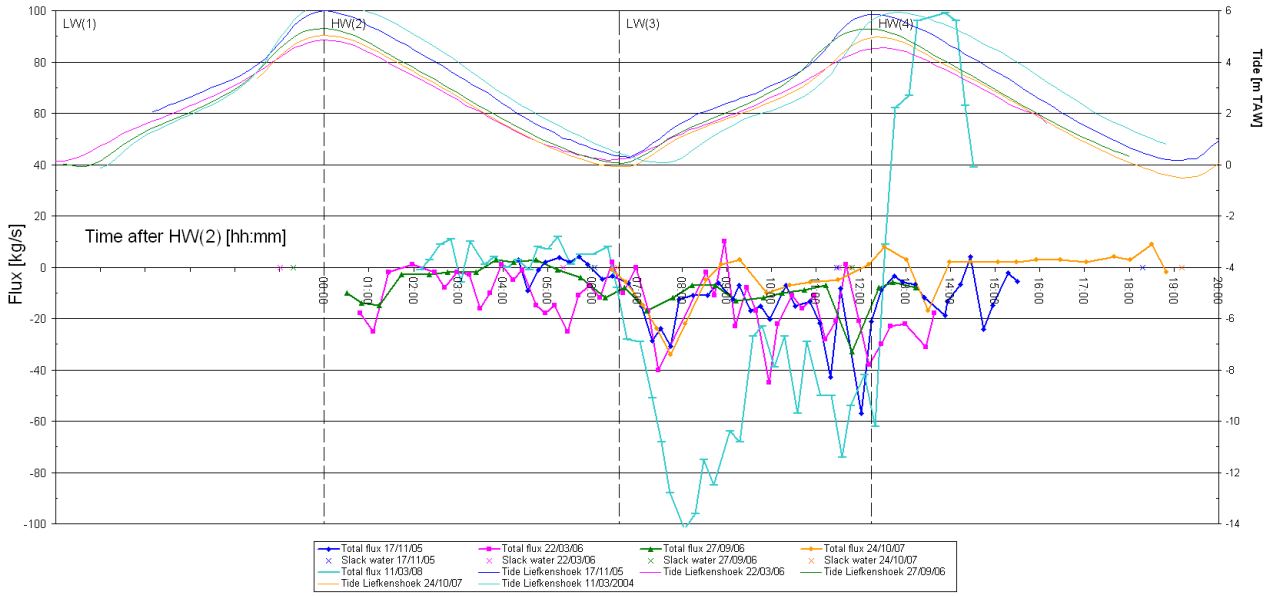



*Figure 5-12: Total flux on 17/02/2005 (Neap tide), 22/03/2006 (Neap tide), 27/09/2006 (Average tide), 24/10/2007 (Average tide) & 11/03/2008 (Spring tide)*

*Table 5-1: Water volume during ebb, flood and measurement campaign on 17/11/2005 (Spring tide), 22/03/2006 (Neap tide), 27/09/2006 (Average tide), 24/10/2007 (Average tide) & 11/03/2008 (Spring tide)*

| ***Measurement Day*** | | ***17/11/2005*** | ***22/03/2006*** | ***27/09/2006*** | ***24/10/2007*** | ***11/03/2008*** |
|---|---|---|---|---|---|---|
| **Ebb** | Volume [1000x m³] | 6 620 | 7 122 | 5 914 | 7 649 | 11 872 |
| | Duration [HH:MM] | 6:50 | 6:20 | 6:40 | 7:24 | 7:44 |
| | Estimated Volume [1000x m³] | 4 276 | 3 511 | 3 946 | 5 592 | 6 254 |
| | Tidal Difference [m] | 5.70 | 4.68 | 5.26 | 5.49 | 6.14 |
| **Flood** | Volume [1000x m³] | -5 558 | -3 517 | -5 224 | - 2 865 | -5 642 |
| | Duration [HH:MM] | 5:24 | 6:10 | 5:48 | 5:11 | 5:05 |
| | Estimated Volume [1000x m³] | -4 186 | -3 286 | -3 931 | -5 154 | -5 959 |
| | Tidal Difference [m] | 5.58 | 4.38 | 5.24 | 5.06 | 5.85 |
| **Net** | Volume [1000x m³] | 1 062 | 3 605 | 690 | 4 784 | 6 230 |
| | Duration [HH:MM] | 12:14 | 12:30 | 12:28 | 12:38 | 12:22 |
| | Estimated Volume [1000x m³] | 90 | 225 | 15 | 438 | 295 |
| **Fresh water (Schelle)** | Volume [1000x m³] | 3 987 | 4 248 | 1 473 | 2 069 | 12 741 |
| | Duration [HH:MM] | 12:14 | 12:30 | 12:28 | 12:35 | 12:22 |
| **Measurement Campaign** | Volume [1000x m³] | -144 | 3 904 | 879 | 4 848 | 5 902 |
| | Duration [HH:MM] | 11:09 | 12:51 | 12:43 | 12:23 | 12:22 |
| **Deurganckdok** | Area [1000x m²] | 750.154 | 750.154 | 750.154 | 1018.606 | 1018.606 |

*Table 5-2: SS Mass during ebb, flood and measurement campaign on 17/11/2005 (Spring tide), 22/03/2006 (Neap tide), 27/09/2006 (Average tide), 24/10/2007 (Neap tide) & 11/03/2008 (Spring tide)*

| ***Measurement Day*** | | ***17/11/2005*** | ***22/03/2006*** | ***27/09/2006*** | ***24/10/2007*** | ***11/03/2008*** |
|---|---|---|---|---|---|---|
| **Ebb** | SS Mass [Tonnes] | -210 | -267 | -126 | 34 | 655 |
| | Duration [HH:MM] | 6:50 | 6:20 | 6:40 | 7:24 | 7:44 |
| | Tidal Difference [m] | 5.70 | 4.68 | 5.26 | 5.49 | 6.14 |
| **Flood** | SS Mass [Tonnes] | -277 | -338 | -256 | -175 | -1 163 |
| | Duration [HH:MM] | 5:24 | 6:10 | 5:48 | 5:11 | 5:05 |
| | Tidal Difference [m] | 5.58 | 4.38 | 5.26 | 5.06 | 5.85 |
| **Net** | SS Mass [Tonnes] | -487 | -605 | -382 | -141 | -508 |
| | Duration [HH:MM] | 12:14 | 12:30 | 12:28 | 12:35 | 12:22 |
| **Measurement Campaign** | SS Mass [Tonnes] | -484 | -648 | -371 | -139 | -525 |
| | Duration [HH:MM] | 11:09 | 12:51 | 12:43 | 12:35 | 12:22 |

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IMDC (2005e). Uitbreiding studie densiteitsstromingen in de Beneden Zeeschelde in het kader van LTV Meetcampagne naar hooggeconcentreerde slibsuspensies Deelrapport 2.4: Schelle 17/02/2005, I/RA/11265/05.0012/MSA.

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IMDC (2005l). Uitbreiding studie densiteitsstromingen in de Beneden Zeeschelde in het kader van LTV Meetcampagne naar hooggeconcentreerde slibsuspensies Deelrapport 5.2: Overview of ambient conditions in the river Scheldt July-December 2005, I/RA/11265/05.019/MSA.

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IMDC (2006d) Uitbreiding studie densiteitsstromingen in de Beneden Zeeschelde in het kader van LTV Meetcampagne naar hooggeconcentreerde slibsuspensies Deelrapport 7.3 22 March 2006 Laure Marie – Liefkenshoek, I/RA/11291/06.096/MSA.

IMDC (2006e) Uitbreiding studie densiteitsstromingen in de Beneden Zeeschelde in het kader van LTV Meetcampagne naar hooggeconcentreerde slibsuspensies Deelrapport 7.4 23 March 2006 Parel 2 – Schelle, I/RA/11291/06.097/MSA.

IMDC (2006f) Uitbreiding studie densiteitsstromingen in de Beneden Zeeschelde in het kader van LTV Meetcampagne naar hooggeconcentreerde slibsuspensies Deelrapport 7.5 23 March 2006 Laure Marie – Deurganckdok (downstream), I/RA/11291/06.098/MSA.

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IMDC (2006j). Uitbreiding studie densiteitsstromingen in de Beneden Zeeschelde in het kader van LTV Meetcampagne naar hooggeconcentreerde slibsuspensies Deelrapport 8.1: Vaste meetopstelling in zake bodemgedrag, I/RA/11291/06.100/MSA.

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IMDC (2007d). Uitbreiding studie densiteitsstromingen in de Beneden Zeeschelde in het kader van LTV Meetcampagne naar hooggeconcentreerde slibsuspensies Deelrapport 11.2 Through tide Measurement Sediview 27/9 Veremans - Raai K (I/RA/11291/06.105/MSA), in opdracht van AWZ.

IMDC (2007e). Uitbreiding studie densiteitsstromingen in de Beneden Zeeschelde in het kader van LTV Meetcampagne naar hooggeconcentreerde slibsuspensies Deelrapport 11.3 Through tide Measurement Sediview & Siltprofiler 28/9 Stream - Raai K (I/RA/11291/06.106/MSA), in opdracht van AWZ.

IMDC (2007f). Uitbreiding studie densiteitsstromingen in de Beneden Zeeschelde in het kader van LTV Meetcampagne naar hooggeconcentreerde slibsuspensies Deelrapport 11.4 Through tide Measurement Sediview 28/9 Veremans - Waarde(I/RA/11291/06.107/MSA), in opdracht van AWZ.

IMDC (2007g). Uitbreiding studie densiteitsstromingen in de Beneden Zeeschelde in het kader van LTV Meetcampagne naar hooggeconcentreerde slibsuspensies Deelrapport 11.5 Through tide Measurement Sediview 28/9 Parel 2 - Schelle (I/RA/11291/06.108/MSA), in opdracht van AWZ.

IMDC (2007h). Uitbreiding studie densiteitsstromingen in de Beneden Zeeschelde in het kader van LTV Meetcampagne naar hooggeconcentreerde slibsuspensies Deelrapport 11.6 Through tide Measurement Salinity Distribution 26/9 Scheldewacht – Deurganckdok in opdracht van AWZ.

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IMDC (2007j) Langdurige metingen Deurganckdok: Opvolging en analyse aanslibbing. Deelrapport 1.2 Sediment Balance: Three monthly report 1/7/2006 – 30/09/2006 (I/RA/11283/06.114/MSA)

IMDC (2007k) Langdurige metingen Deurganckdok: Opvolging en analyse aanslibbing. Deelrapport 1.3 Sediment Balance: Three monthly report 1/10/2006 – 31/12/2006 (I/RA/11283/06.115/MSA)

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IMDC (2007m) Langdurige metingen Deurganckdok: Opvolging en analyse aanslibbing. Deelrapport 1.5 Annual Sediment Balance (I/RA/11283/06.117/MSA)

IMDC (2007n) Langdurige metingen Deurganckdok: Opvolging en analyse aanslibbing. Deelrapport 2.2 Through tide measurement SiltProfiler 26/09/2006 Stream (I/RA/11283/06.068/MSA)

IMDC (2007o) Langdurige metingen Deurganckdok: Opvolging en analyse aanslibbing. Deelrapport 2.7 Salt-Silt distribution & Frame Measurements Deurganckdok 15/07/2006 – 31/10/2006 (I/RA/11283/06.122/MSA)

IMDC (2007p) Langdurige metingen Deurganckdok: Opvolging en analyse aanslibbing. Deelrapport 2.8 Salt-Silt distribution & Frame Measurements Deurganckdok 15/01/2007 – 15/03/2007 (I/RA/11283/06.123/MSA)

IMDC (2007q) Langdurige metingen Deurganckdok: Opvolging en analyse aanslibbing. Deelrapport 3.1 Boundary conditions: Three monthly report 1/1/2007 – 31/03/2007 (I/RA/11283/06.127/MSA)

IMDC (2007r) Langdurige metingen Deurganckdok: Opvolging en analyse aanslibbing Deelrapport 1.10: Sediment Balance: Three monthly report 1/4/2007 – 30/06/2007 (I/RA/11283/07.081/MSA)

IMDC (2007s) Langdurige metingen Deurganckdok: Opvolging en analyse aanslibbing. Deelrapport 1.11: Sediment Balance: Three monthly report 1/7/2007 – 30/09/2007 (I/RA/11283/07.082/MSA)

IMDC (2007t) Langdurige metingen Deurganckdok: Opvolging en analyse aanslibbing. Deelrapport 2.16: Salt-Silt distribution Deurganckdok summer (21/6/2007 – 30/07/2007) (I/RA/11283/07.092/MSA)

IMDC (2007v) Langdurige metingen Deurganckdok: Opvolging en analyse aanslibbing. Deelrapport 3.10: Boundary conditions: Three monthly report 1/04/2007 – 30/06/2007 (I/RA/11283/07.097/MSA)

IMDC (2007w) Langdurige metingen Deurganckdok: Opvolging en analyse aanslibbing. Deelrapport 3.11: Boundary conditions: Two monthly report 1/07/2007 – 30/09/2007 (I/RA/11283/07.098/MSA)

IMDC (2008a) Langdurige metingen Deurganckdok: Opvolging en analyse aanslibbing. Deelrapport 2.5: Through tide measurement Sediview average tide 24/10/2007 (I/RA/11283/06.120/MSA)

IMDC (2008b) Langdurige metingen Deurganckdok: Opvolging en analyse aanslibbing. Deelrapport 4.1: Analysis of siltation Processes and Factors (I/RA/11283/06.129/MSA)

IMDC (2008c) Langdurige metingen Deurganckdok: Opvolging en analyse aanslibbing. Deelrapport 1.12: Sediment Balance: Four monthly report 1/9/2007 – 31/12/2007 (I/RA/11283/07.083/MSA)

IMDC (2008d) Langdurige metingen Deurganckdok: Opvolging en analyse aanslibbing. Deelrapport 1.13: Sediment Balance: Four monthly report 1/01/2007 – 31/03/2007 (I/RA/11283/07.084/MSA)

IMDC (2008e) Langdurige metingen Deurganckdok: Opvolging en analyse aanslibbing. Deelrapport 1.14: Annual Sediment Balance. (I/RA/11283/07.085/MSA)

IMDC (2008f) Langdurige metingen Deurganckdok: Opvolging en analyse aanslibbing. Deelrapport 2.09: Calibration stationary equipment autumn (I/RA/11283/07.095/MSA)

IMDC (2008g) Langdurige metingen Deurganckdok: Opvolging en analyse aanslibbing. Deelrapport 2.10: Through tide measurement SiltProfiler 23 October 2007 (I/RA/11283/07.086/MSA)

IMDC (2008h) Langdurige metingen Deurganckdok: Opvolging en analyse aanslibbing. Deelrapport 2.11: Through tide measurement Salinity Profiling winter 12 March 2008 (I/RA/11283/07.087/MSA)

IMDC (2008i) Langdurige metingen Deurganckdok: Opvolging en analyse aanslibbing. Deelrapport 2.12: Through tide measurement Sediview winter 11 March 2008 – Transect I (I/RA/11283/07.088/MSA)

IMDC (2008j) Langdurige metingen Deurganckdok: Opvolging en analyse aanslibbing. Deelrapport 2.13: Through tide measurement Sediview winter 11 March 2008 – Transect K (I/RA/11283/07.089/MSA)

IMDC (2008k) Langdurige metingen Deurganckdok: Opvolging en analyse aanslibbing. Deelrapport 2.14: Through tide measurement Sediview winter 11 March 2008 – Transect DGD (I/RA/11283/07.090/MSA)

IMDC (2008l) Langdurige metingen Deurganckdok: Opvolging en analyse aanslibbing. Deelrapport 2.15: Through tide measurement SiltProfiler winter 12 March 2008 (I/RA/11283/07.091/MSA)

IMDC (2008m) Langdurige metingen Deurganckdok: Opvolging en analyse aanslibbing. Deelrapport 2.17: Salt-Silt distribution & Frame Measurements Deurganckdok autumn (17/9/2007-10/12/2007) (I/RA/11283/07.093/MSA)

IMDC (2008n) Langdurige metingen Deurganckdok: Opvolging en analyse aanslibbing. Deelrapport 2.18: Salt-Silt distribution & Frame Measurements Deurganckdok winter (18/02/2007-31/03/2008) (I/RA/11283/07.094/MSA)

IMDC (2008o) Langdurige metingen Deurganckdok: Opvolging en analyse aanslibbing. Deelrapport 2.19: Calibration stationary & mobile equipment winter (I/RA/11283/07.096/MSA)

IMDC (2008p) Langdurige metingen Deurganckdok: Opvolging en analyse aanslibbing. Deelrapport 3.12: Boundary conditions: Three monthly report 1/9/2007 – 31/12/2007 (I/RA/11283/07.099/MSA)

IMDC (2008q) Langdurige metingen Deurganckdok: Opvolging en analyse aanslibbing. Deelrapport 3.13: Boundary conditions: Three monthly report 1/1/2008 – 31/3/2007 (I/RA/11283/07.100/MSA)

IMDC (2008r) Langdurige metingen Deurganckdok: Opvolging en analyse aanslibbing. Deelrapport 3.14: Boundary conditions: Annual report (I/RA/11283/07.101/MSA)

IMDC (2008s) Langdurige metingen Deurganckdok: Opvolging en analyse aanslibbing. Deelrapport 4.10: Analysis of siltation Processes and Factors (I/RA/11283/07.102/MSA)

TV SAM (2006a) Langdurige stationaire ADCP stroommetingen te Oosterweel dukdalf 01/2005-06/2005. 42SR S032PIB 2A.

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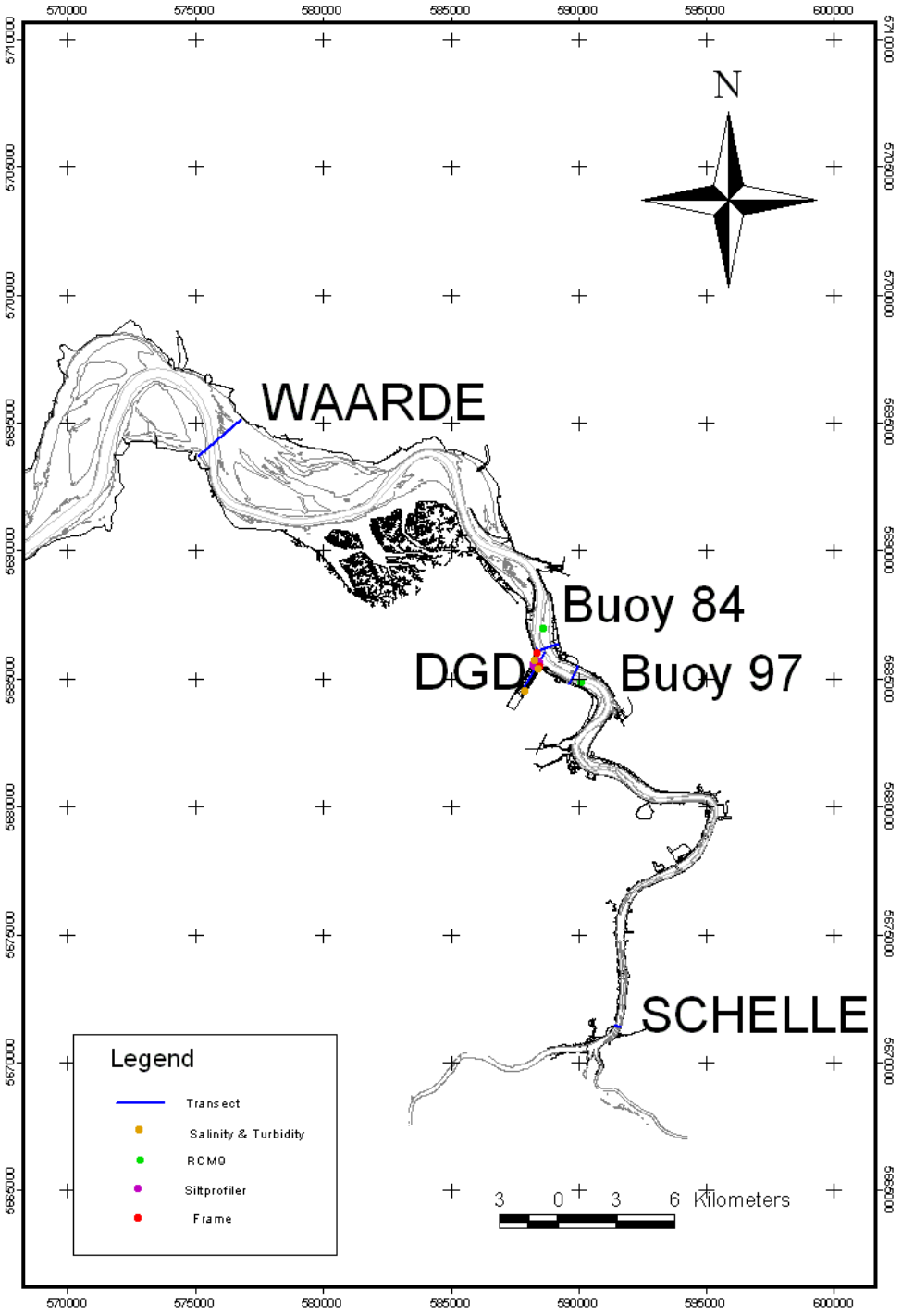
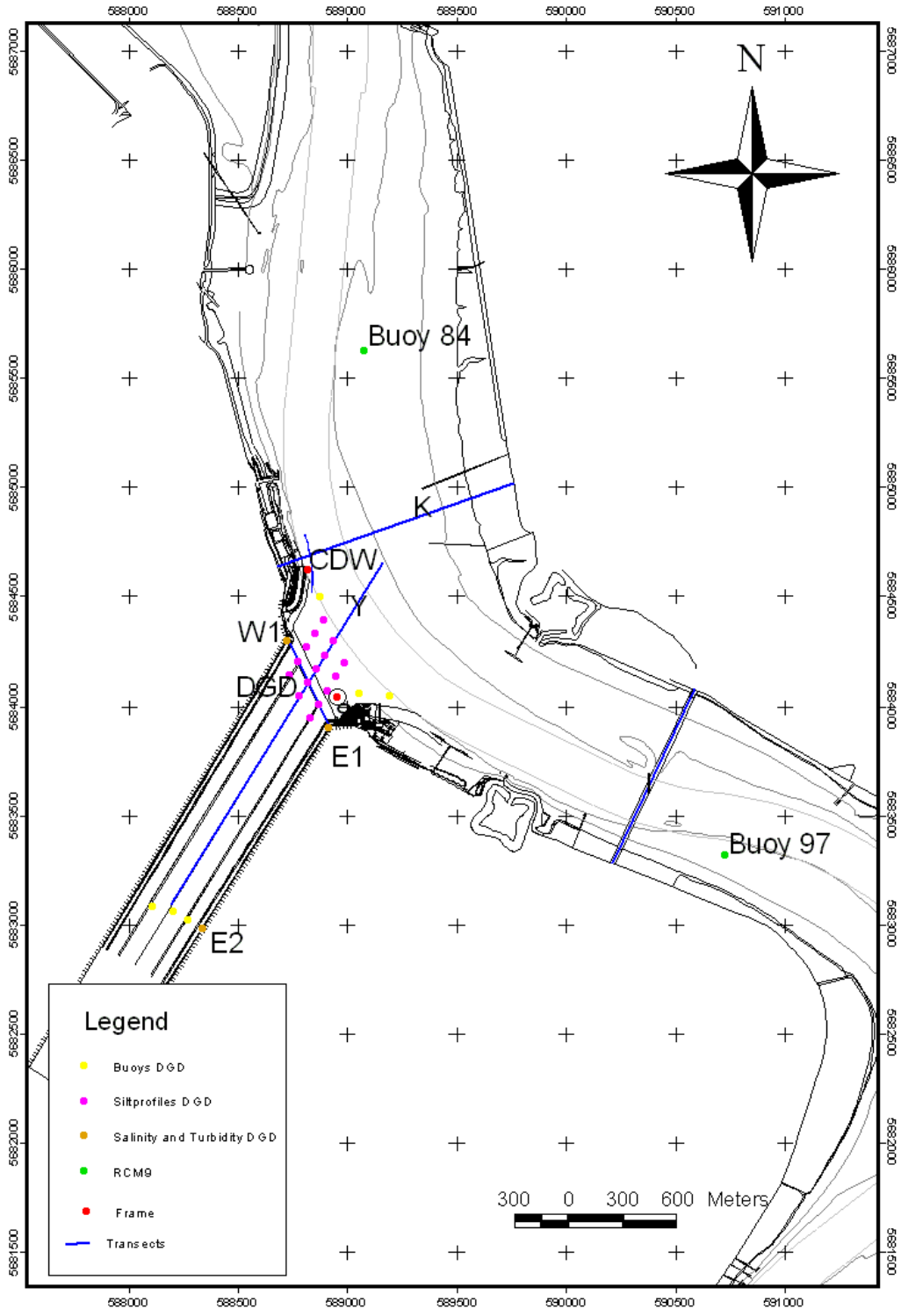
# APPENDIX A.

# OVERVIEW OF MEASUREMENT

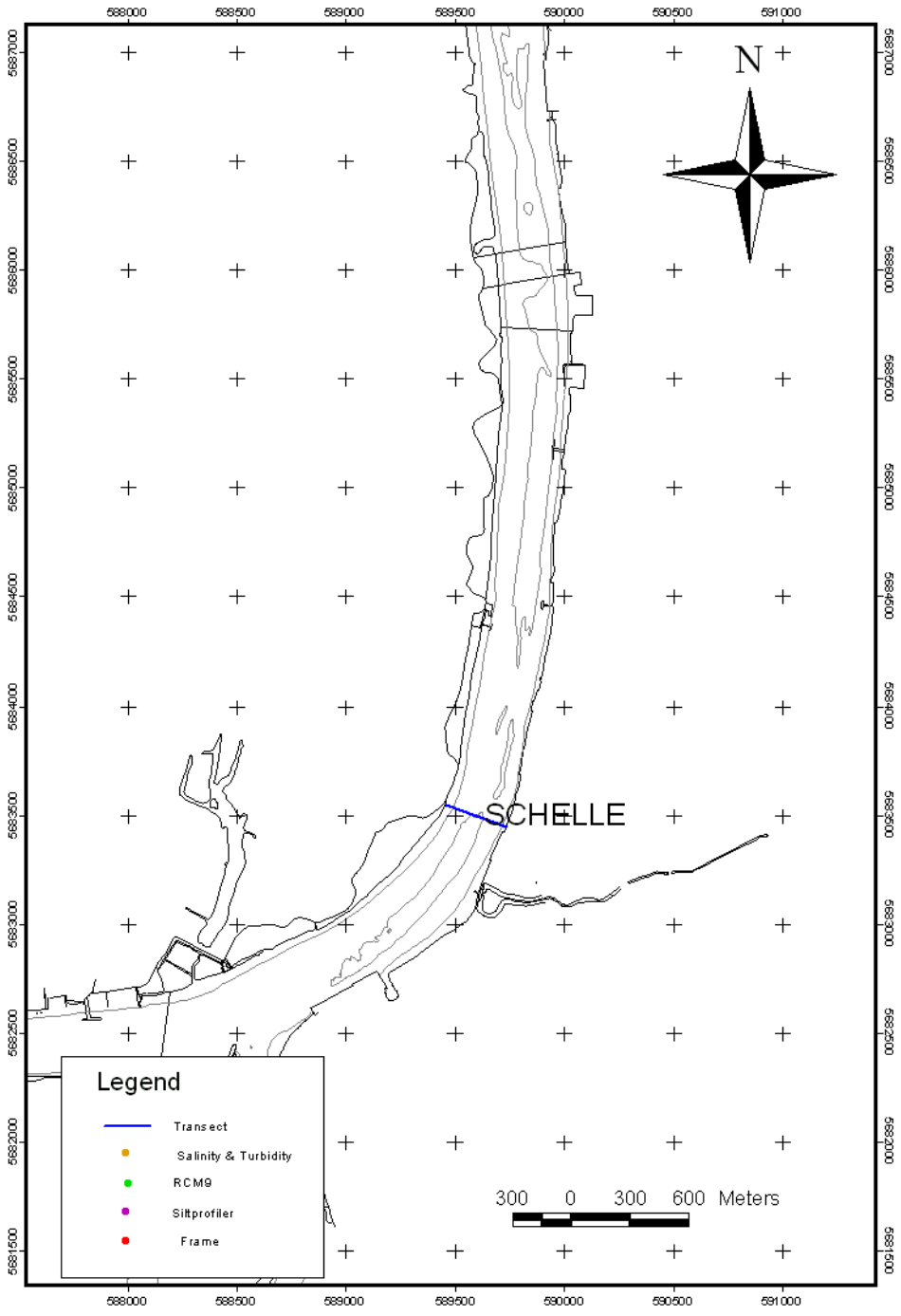
## A.1 Overview of the measurement locations for the whole HCBS2 and Deurganckdok measurement campaigns



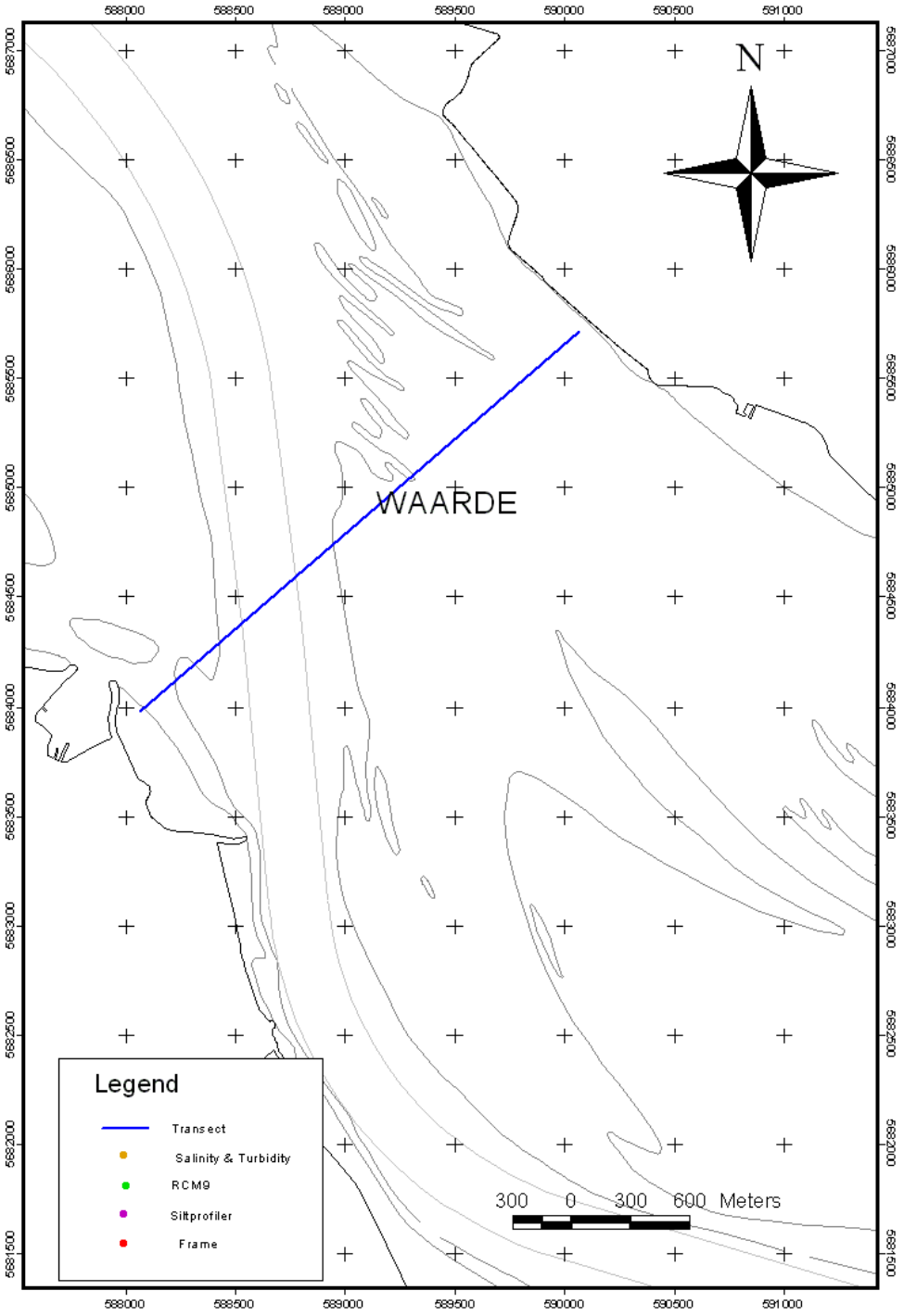

*Annex Figure A-1: Overview of the measurement locations*




*Annex Figure A-2: Overview of the measurement locations at Deurganckdok*




*Annex Figure A-3: Transect S in Schelle*




*Annex Figure A-4: Transect W in Waarde*

## A.2 Overview of all measurement locations HCBS and Deurganckdok measurement campaigns

*Annex Table A-1: coordinates of theoretical transects*

| *Transect* | *Start Easting* | *Start Northing* | *End Easting* | *End Northing* |
|---|---|---|---|---|
| I | 590318.00 | 5683302.00 | 590771.00 | 5684257.00 |
| K | 588484.00 | 5684924.00 | 589775.00 | 5685384.00 |
| SCHELLE | 592645.07 | 5665794.06 | 592952.68 | 5665682.28 |
| DGD | 588764.88 | 5684056.49 | 588540.95 | 5684526.94 |
| Y | 589059.09 | 5684948.36 | 587898.76 | 5683076.56 |
| WAARDE | 573541.00 | 5696848.20 | 571318.00 | 5694932.90 |

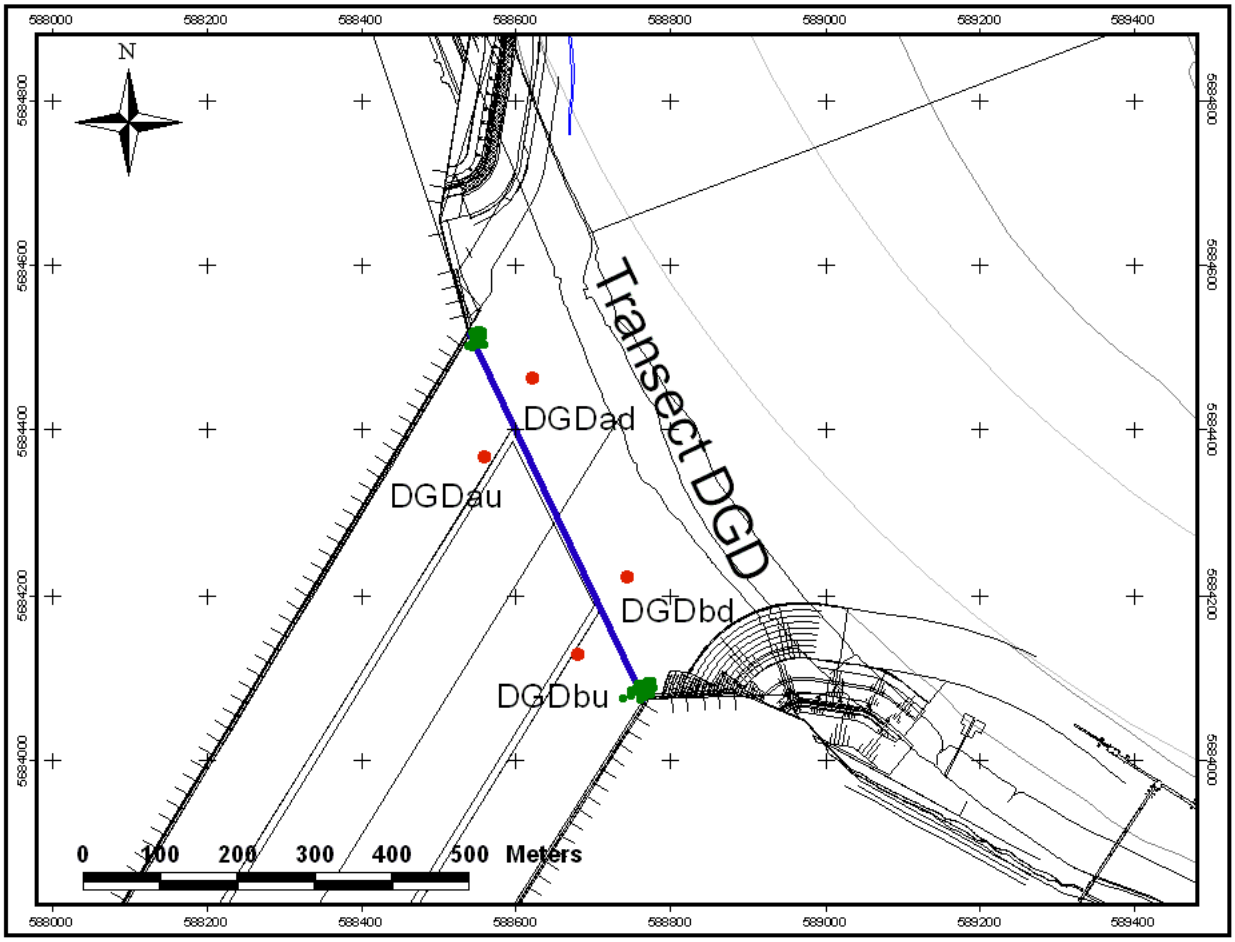
*Annex Table A-2: coordinates of SiltProfiler gauging locations*

| *SP* | *EASTING* | *NORTHING* |
|---|---|---|
| 1 | 588737 | 5684638 |
| 2 | 588690 | 5684562 |
| 3 | 588643 | 5684486 |
| 4 | 588596 | 5684411 |
| 5 | 588549 | 5684335 |
| 6 | 588606 | 5684217 |
| 7 | 588653 | 5684293 |
| 8 | 588700 | 5684368 |
| 9 | 588747 | 5684444 |
| 10 | 588793 | 5684520 |
| 11 | 588850 | 5684402 |
| 12 | 588803 | 5684326 |
| 13 | 588756 | 5684250 |
| 14 | 588709 | 5684174 |
| 15 | 588662 | 5684099 |

## A.3 Measurement overview at Transect DGD on 11/03/2008

| *FileName* | *End time [hh:mm MET]* | *Time after HW [hh:mm]* | *Easting Start (UTM31 ED50)* | *Northing Start (UTM31 ED50)* | *Easting Stop (UTM31 ED50)* | *Northing Stop (UTM31 ED50)* | *Transect length [m]* | *Transect heading [°]* |
|---|---|---|---|---|---|---|---|---|
| 3003DGDt_sub.csv | 07:11 | 02:11 | 588776 | 5684074 | 588549 | 5684529 | 509 | 334 |
| 3005DGDs_sub.csv | 07:23 | 02:23 | 588558 | 5684530 | 588775 | 5684072 | 507 | 155 |
| 3007DGDt_sub.csv | 07:38 | 02:38 | 588776 | 5684079 | 588548 | 5684530 | 506 | 333 |
| 3009DGDs_sub.csv | 07:52 | 02:52 | 588553 | 5684530 | 588771 | 5684067 | 512 | 155 |
| 3011DGDt_sub.csv | 08:05 | 03:05 | 588771 | 5684072 | 588547 | 5684524 | 504 | 334 |
| 3013DGDs_sub.csv | 08:18 | 03:18 | 588554 | 5684529 | 588771 | 5684068 | 510 | 155 |
| 3015DGDt_sub.csv | 08:37 | 03:37 | 588772 | 5684066 | 588544 | 5684510 | 500 | 333 |
| 3017DGDs_sub.csv | 08:50 | 03:50 | 588558 | 5684523 | 588759 | 5684069 | 497 | 156 |
| 3019DGDt_sub.csv | 09:08 | 04:08 | 588770 | 5684064 | 588548 | 5684524 | 511 | 334 |
| 3021DGDs_sub.csv | 09:22 | 04:22 | 588548 | 5684520 | 588758 | 5684066 | 500 | 155 |
| 3023DGDt_sub.csv | 09:38 | 04:38 | 588773 | 5684071 | 588545 | 5684528 | 510 | 334 |
| 3025DGDs_sub.csv | 09:48 | 04:48 | 588549 | 5684529 | 588774 | 5684062 | 518 | 154 |
| 3027DGDt_sub.csv | 10:02 | 05:02 | 588771 | 5684073 | 588547 | 5684530 | 508 | 334 |
| 3029DGDs_sub.csv | 10:15 | 05:15 | 588552 | 5684532 | 588763 | 5684073 | 506 | 155 |
| 3031DGDt_sub.csv | 10:33 | 05:33 | 588768 | 5684072 | 588548 | 5684527 | 506 | 334 |
| 3033DGDs_sub.csv | 10:45 | 05:45 | 588551 | 5684526 | 588771 | 5684064 | 511 | 155 |
| 3035DGDt_sub.csv | 11:02 | 06:02 | 588772 | 5684071 | 588547 | 5684527 | 509 | 334 |
| 3037DGDs_sub.csv | 11:22 | 06:22 | 588560 | 5684512 | 588768 | 5684063 | 494 | 155 |
| 3039DGDt_sub.csv | 11:35 | 06:35 | 588762 | 5684067 | 588546 | 5684528 | 509 | 335 |
| 3041DGDs_sub.csv | 11:48 | 06:48 | 588546 | 5684520 | 588771 | 5684066 | 507 | 154 |
| 3043DGDt_sub.csv | 12:06 | 07:06 | 588770 | 5684068 | 588547 | 5684528 | 512 | 334 |
| 3045DGDs_sub.csv | 12:22 | 07:22 | 588541 | 5684511 | 588770 | 5684064 | 503 | 153 |
| 3047DGDt_sub.csv | 12:34 | -05:16 | 588741 | 5684056 | 588545 | 5684515 | 499 | 337 |
| 3049DGDs_sub.csv | 12:46 | -05:04 | 588550 | 5684513 | 588762 | 5684063 | 497 | 155 |
| 3051DGDt_sub.csv | 13:05 | -04:45 | 588751 | 5684060 | 588540 | 5684511 | 499 | 335 |
| 3053DGDt_sub.csv | 13:20 | -04:30 | 588550 | 5684523 | 588771 | 5684062 | 511 | 154 |
| 3055DGDt_sub.csv | 13:31 | -04:19 | 588760 | 5684066 | 588546 | 5684528 | 510 | 335 |
| 3057DGDs_sub.csv | 13:45 | -04:05 | 588552 | 5684525 | 588768 | 5684061 | 512 | 155 |
| 3059DGDt_sub.csv | 14:06 | -03:44 | 588767 | 5684064 | 588546 | 5684527 | 513 | 334 |
| 3061DGDs_sub.csv | 14:20 | -03:30 | 588552 | 5684523 | 588770 | 5684061 | 511 | 155 |
| 3063DGDt_sub.csv | 14:38 | -03:12 | 588762 | 5684065 | 588547 | 5684529 | 512 | 335 |
| 3065DGDt_sub.csv | 14:50 | -03:00 | 588551 | 5684531 | 588763 | 5684055 | 521 | 156 |
| 3067DGDt_sub.csv | 15:06 | -02:44 | 588752 | 5684063 | 588548 | 5684528 | 509 | 336 |
| 3069DGDs_sub.csv | 15:19 | -02:31 | 588555 | 5684532 | 588764 | 5684061 | 515 | 156 |
| 3071DGDt_sub.csv | 15:37 | -02:13 | 588767 | 5684067 | 588548 | 5684530 | 512 | 335 |
| 3073DGDs_sub.csv | 15:49 | -02:01 | 588553 | 5684531 | 588767 | 5684058 | 519 | 156 |
| 3075DGDt_sub.csv | 16:08 | -01:42 | 588750 | 5684067 | 588546 | 5684525 | 501 | 336 |
| 3077DGDs_sub.csv | 16:22 | -01:28 | 588553 | 5684531 | 588765 | 5684056 | 520 | 156 |
| 3079DGDt_sub.csv | 16:37 | -01:13 | 588765 | 5684061 | 588547 | 5684528 | 515 | 335 |
| 3081DGDs_sub.csv | 16:49 | -01:01 | 588547 | 5684517 | 588763 | 5684059 | 506 | 155 |

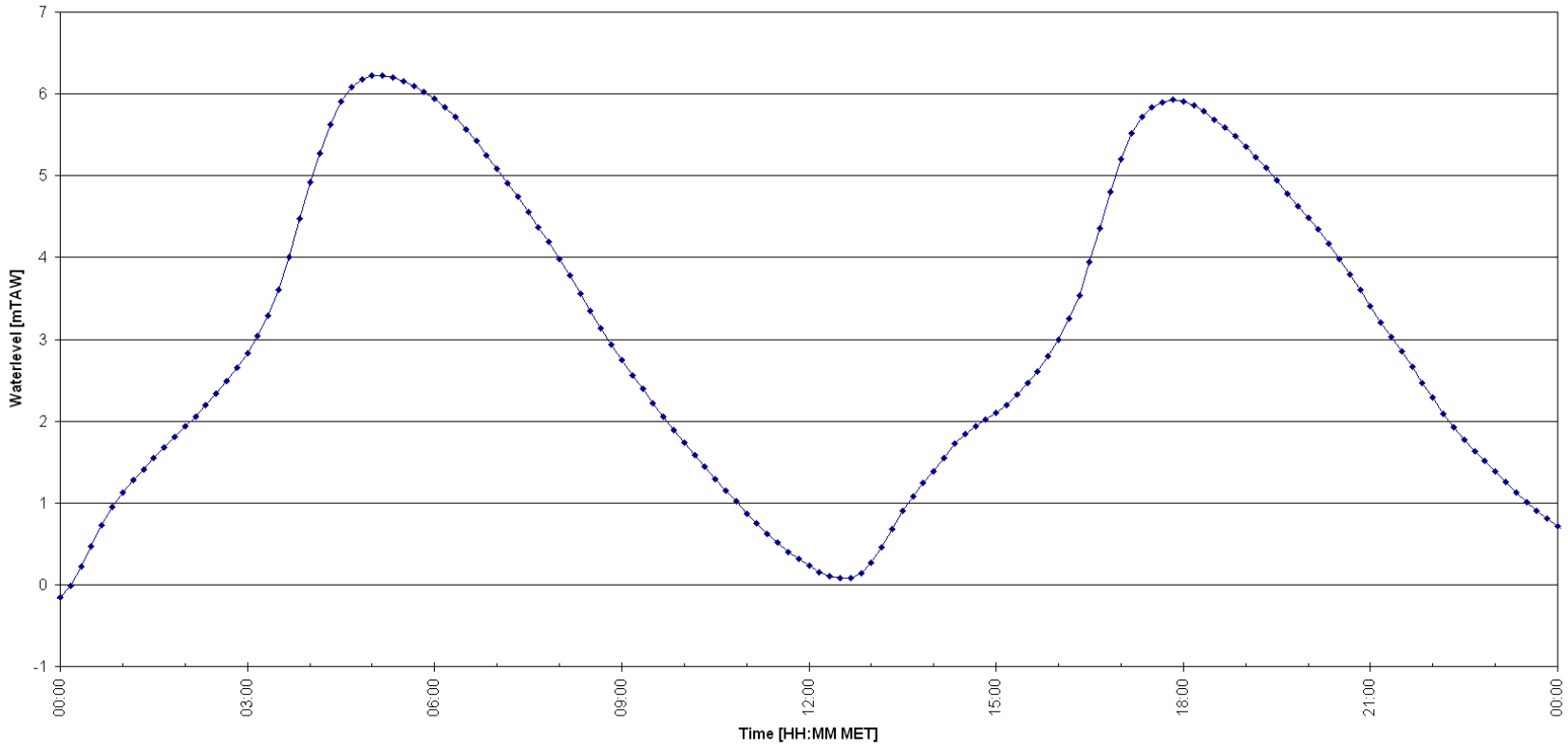
| *FileName* | *End time [hh:mm MET]* | *Time after HW [hh:mm]* | *Easting Start (UTM31 ED50)* | *Northing Start (UTM31 ED50)* | *Easting Stop (UTM31 ED50)* | *Northing Stop (UTM31 ED50)* | *Transect length [m]* | *Transect heading [°]* |
|---|---|---|---|---|---|---|---|---|
| 3083DGDt_sub.csv | 17:07 | -00:43 | 588755 | 5684067 | 588546 | 5684527 | 506 | 336 |
| 3085DGDs_sub.csv | 17:21 | -00:29 | 588555 | 5684528 | 588767 | 5684060 | 514 | 156 |
| 3087DGDt_sub.csv | 17:35 | -00:15 | 588757 | 5684070 | 588548 | 5684527 | 502 | 335 |
| 3089DGDs_sub.csv | 17:48 | -00:02 | 588556 | 5684524 | 588770 | 5684061 | 510 | 155 |
| 3091DGDt_sub.csv | 18:06 | 00:16 | 588760 | 5684076 | 588547 | 5684529 | 500 | 335 |
| 3093DGDs_sub.csv | 18:18 | 00:28 | 588556 | 5684512 | 588767 | 5684060 | 499 | 155 |
| 3095DGDt_sub.csv | 18:42 | 00:52 | 588770 | 5684079 | 588546 | 5684528 | 501 | 333 |
| 3097DGDt_sub.csv | 18:55 | 01:05 | 588552 | 5684527 | 588770 | 5684061 | 515 | 155 |
| 3099DGDt_sub.csv | 19:10 | 01:20 | 588778 | 5684070 | 588547 | 5684526 | 511 | 333 |
| 3101DGDs_sub.csv | 19:22 | 01:32 | 588554 | 5684527 | 588764 | 5684058 | 514 | 156 |
| 3103DGDt_sub.csv | 19:33 | 01:43 | 588762 | 5684075 | 588549 | 5684527 | 499 | 335 |




*Annex Figure A-5: Location of start en end points of the sailed tracks*

# APPENDIX B. TIDAL DATA

# 11283 – March 2008 SURVEY




## Measured tide on 11/03/2008 at Liefkenshoek

| Location: | Date: |
|---|---|
| River Scheldt | 11/03/2008 |

*Data processed by:* IMDC

*In association with:* WL | delft hydraulics, GEMS International

I/RA/11283/07.090/MSA

# APPENDIX C.

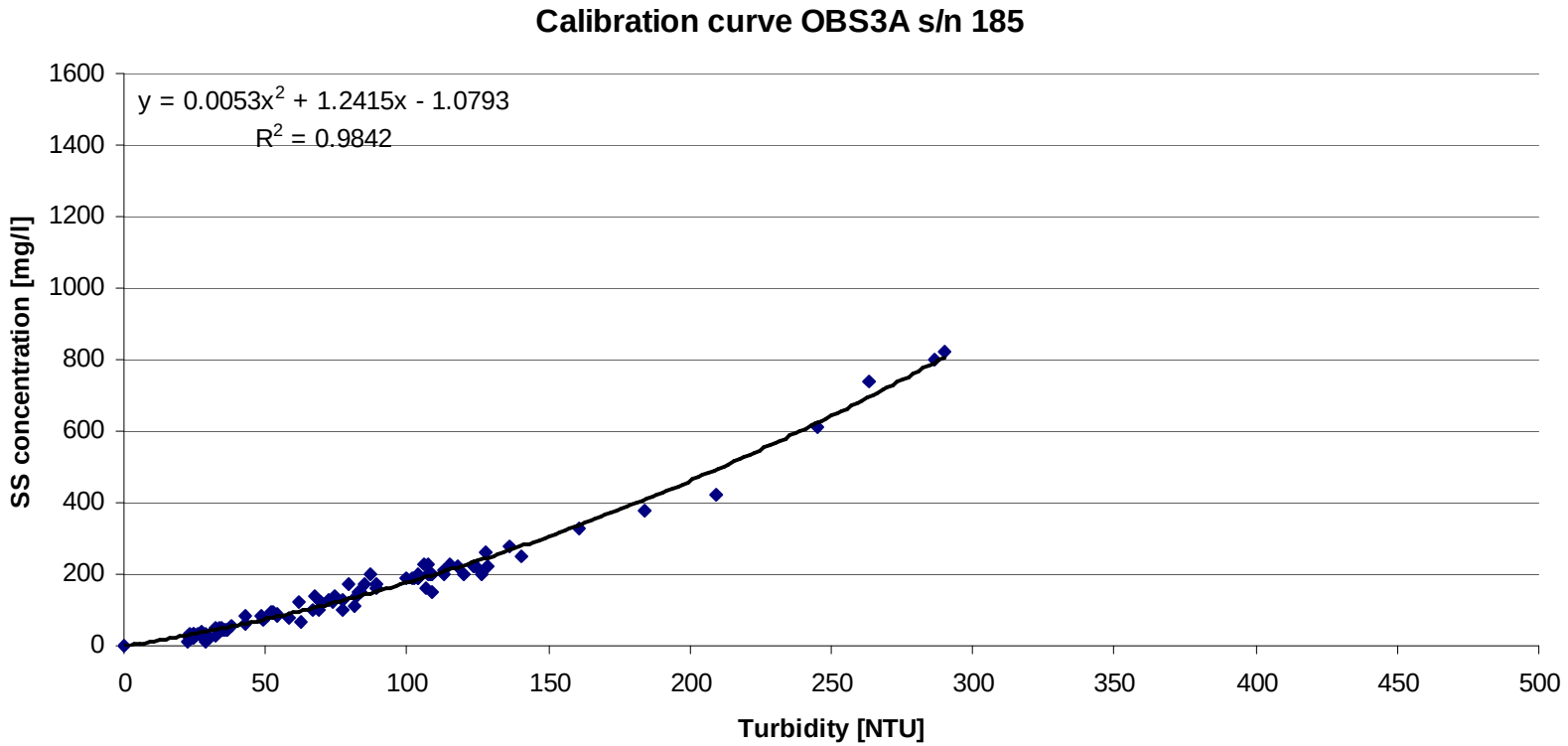
# NAVIGATION INFORMATION AS RECORDED ON SITE

| ***Ship:*** | | ***Parel II*** | |
|---|---|---|---|
| ***Location:*** | | ***Deurganckdok (transect DGD)*** | |
| ***Nr.*** | ***Time (MET)*** | ***Type ship*** | ***Direction (Invaart, Uitvaart)*** |
| ***1*** | *7:30* | *2 Binnenschepen* | *Invaart* |
| ***2*** | *7:35* | *1 Binnenschip* | *Invaart* |
| ***3*** | *7:45* | *1 Binnenschip* | *Uitvaart* |
| ***4*** | *8:10* | *2 Binnenschepen* | *Uitvaart* |
| ***5*** | *8:54* | *1 Bagger zeeschip* | *Invaart* |
| ***6*** | *9:06* | *1 Binnenschip* | *Invaart* |
| ***7*** | *9:15* | *1 Binnenschip* | |
| ***8*** | *9:30* | *1 Binnenschip* | *Uitvaart* |
| ***9*** | *9:40* | *1 Binnenschip* | *Invaart* |
| ***10*** | *9:40* | *Sleper* | *Invaart* |
| ***11*** | *10:10* | *Duwbak* | *Uitvaart* |
| ***12*** | *10:41* | *Sleper* | *Uitvaart* |
| ***13*** | *10:46* | *Sleper* | *Uitvaart* |
| ***14*** | *11:00* | *1 Binnenschip* | *Uitvaart* |
| ***15*** | *11:00* | *Zeeschip* | *Invaart* |
| ***16*** | *11:14* | *Binnenschip* | *Invaart* |
| ***17*** | *11:15* | *Binnenschip* | *Uitvaart* |
| ***18*** | *11:16* | *Binnenschip* | *Invaart* |
| ***19*** | *11:40* | *Binnenschip* | *Uitvaart* |
| ***20*** | *11:45* | *Sleper* | *Uitvaart* |
| ***21*** | *11:45* | *Binnenvaart* | *Uitvaart* |
| ***22*** | *12:01* | *Binnenvaart* | *Invaart* |
| ***23*** | *12:35* | *Binnenvaart* | *Invaart* |
| ***24*** | *12:44* | *Binnenvaart* | *Invaart* |
| ***25*** | *13:10* | *Binnenschip* | *Uitvaart* |
| ***26*** | *13:36* | *Binnenschip* | *Uitvaart* |
| ***27*** | *13:40* | *Binnenschip* | *Uitvaart* |
| ***28*** | *14:02* | *Coaster* | *Afvaart* |
| ***29*** | *14:28* | *2 Binnenschepen* | *Uitvaart* |
| ***30*** | *14:35* | *Binnenschip* | *Uitvaart* |
| ***31*** | *15:29* | *Binnenschip* | *Uitvaart* |

| ***Ship:*** | | ***Parel II*** | |
|---|---|---|---|
| ***Location:*** | | ***Deurganckdok (transect DGD)*** | |
| ***Nr.*** | ***Time (MET)*** | ***Type ship*** | ***Direction (Invaart, Uitvaart)*** |
| ***32*** | *16:05* | *Binnenschip* | *Invaart* |
| ***33*** | *16:05* | *Binnenschip* | *Invaart* |
| ***34*** | *16:21* | | *Uitvaart* |
| ***35*** | *16:51* | *Binnenschip* | *Invaart* |
| ***36*** | *17:18* | *Binnenschip* | *Invaart* |
| ***37*** | *17:42* | *Binnenschip* | *Uitvaart* |
| ***38*** | *17:42* | *Binnenschip* | *Uitvaart* |
| ***39*** | *17:44* | *Sleper* | *Invaart* |
| ***40*** | *17:44* | *Sleper* | *Invaart* |
| ***41*** | *18:02* | *Sweepbeam* | *Uitvaart* |
| ***42*** | *18:30* | *Maersk Maryland* | *Uitvaart* |
| ***43*** | *18:47* | *DN 31* | *Invaart* |
| ***44*** | *19:04* | *Binnenvaart* | *Uitvaart* |
| ***45*** | *19:07* | *Binnenvaart* | *Invaart* |
| ***46*** | *19:08* | *Binnenvaart* | *Uitvaart* |
| ***47*** | *19:31* | *Binnenvaart* | *Invaart* |

# APPENDIX D. CALIBRATION GRAPH OF OBS3A TURBIDITY SENSOR

# 11283 – March 2008 SURVEY




| Calibration Graph of OBS3A s/n 185 | | *Data processed by:* IMDC |
|---|---|---|
| Location: River Scheldt (DGD) | Date: 11/03/2008 | *In association with:* WL \| delft hydraulics, GEMS International |
| | | I/RA/11283/07.090/MSA |

# APPENDIX E.

# UNESCO PPS-78 FORMULA FOR CALCULATING SALINITY

## Practical Salinity Scale (PPS 78)  Salinity in the range of 2 to 42

**Constants from the 19th Edition of Standard Methods**

| | | | |
|---|---|---|---|
| R cond.ratio | 0.0117 | $R = \frac{C}{42.914 mS/cm}$ | |
| **C Cond at t** | **0.5** | | **Input conductivity in mS/cm of sample** |
| **t deg. C** | **22.00** | | **Input temperature of sample solution** |
| **P dBar** | **20** | | **Input pressure at which sample is measured in decibars** |
| Rp | 1.0020845 | $R_p = 1 + \frac{p(e_1 + e_2 p + e_3 p^2)}{1 + d_1 t + d_2 t^2 + (d_3 + d_4 t)R}$ | |
| rt | 1.1641102 | $r_t = c_0 + c_1 t + c_2 t^2 + c_3 t^3 + c_4 t^4$ | |
| Rt | 0.0099879 | $R_t = \frac{R}{R_p \times r_t}$ | |
| Delta S | -0.0010 | $\text{Delta } S = \frac{(t-15)}{1+k(t-15)}(b_0 + b_1 R_t^{1/2} + b_2 R_t + b_3 R_t^{3/2} + b_4 R_t^2 + b_5 R_t^{5/2})$ | |
| **S = Salinity** | **0.257** | $S = a_0 + a_1 R_t^{1/2} + a_2 R_t + a_3 R_t^{3/2} + a_4 R_t^2 + a_5 R_t^{5/2} + \text{delta } S$ | |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| a0 | 0.0080 | b0 | 0.0005 | c0 | 0.6766097 | d1 | 3.426E-02 | e1 | 2.070E-04 |
| a1 | -0.1692 | b1 | -0.0056 | c1 | 2.00564E-02 | d2 | 4.464E-04 | e2 | -6.370E-08 |
| a2 | 25.3851 | b2 | -0.0066 | c2 | 1.104259E-04 | d3 | 4.215E-01 | e3 | 3.989E-12 |
| a3 | 14.0941 | b3 | -0.0375 | c3 | -6.9698E-07 | d4 | -3.107E-03 | | |
| a4 | -7.0261 | b4 | 0.0636 | c4 | 1.0031E-09 | | | | |
| a5 | 2.7081 | b5 | -0.0144 | | | | | | |
| | | k | 0.0162 | | | | | | |

**R** = ratio of measured conductivity to the conductivity of the Standard Seawater Solution

Conductivity Ratio R is a function of salinity, temperature, and hydraulic pressure. So that we can factor R into three parts i.e.

**R = Rt x Rp x rt**

**R = C(S,t,p)/C(35,15,0)**

**C = 42.914 mS/cm at 15 deg C and 0 dbar pressure ie C(35,15,0) where 35 is the salinity**

**Ocean pressure is usually measured in decibars. 1 dbar = 10^-1 bar = 10^5 dyne/cm^2 = 10^4 Pascal.**

# APPENDIX F. OVERVIEW OF SEDIVIEW SETTINGS

| ***Ship:*** | ***Parel II*** | | |
|---|---|---|---|
| ***Location:*** | ***Deurganckdok (transect DGD)*** | | |
| ***Date*** | ***11/03/2008*** | | |
| ***Parameters*** | ***Value*** | ***Parameters*** | ***Value*** |
| *Inst. Depth (m)* | 1.1 | *Compass offset (°)* | 2.3 |
| *Force depth (m)* | 0 | *Beam 3 misalignment (°)* | 0 |
| *Velocity reference* | BT | *Effective particle size (µm)* | 20 |
| *Speed of sound algorithm* | Urick | *Beam1 scale factor* | 0.431 |
| *Error velocity* | YES | *Beam2 scale factor* | 0.417 |
| *External heading* | NO | *Beam3 scale factor* | 0.427 |
| *External Depth* | NO | *Beam4 scale factor* | 0.445 |
| *SSC factor top (%)* | 100 | *Discharge factor top* | Constant |
| *SSC factor bottom (%)* | Variable | *Discharge factor bottom* | Power |
| *Shape factor left bank* | 0.91 | *Shape factor right bank* | 0.91 |

| ***Filename*** | ***Calibration const (Ks)*** | ***Backscatter coefficient (S)*** | ***SSC factor bottom (%)*** | ***Distance to the left bank (m)*** | ***Distance to the right bank (m)*** |
|---|---|---|---|---|---|
| 3003DGDt_sub.csv | 55 | 20.75 | 117 | 1.32 | 11.56 |
| 3005DGDs_sub.csv | 55 | 21.00 | 141 | 4.43 | 10.31 |
| 3007DGDt_sub.csv | 55 | 21.00 | 147 | 0.33 | 15.79 |
| 3009DGDs_sub.csv | 55 | 20.50 | 125 | 2.51 | 7.45 |
| 3011DGDt_sub.csv | 55 | 19.50 | 111 | 5.47 | 11.88 |
| 3013DGDs_sub.csv | 55 | 19.50 | 103 | 3.35 | 8.28 |
| 3015DGDt_sub.csv | 55 | 19.75 | 109 | 16.05 | 5.84 |
| 3017DGDs_sub.csv | 55 | 20.00 | 109 | 10.68 | 14.54 |
| 3019DGDt_sub.csv | 55 | 20.50 | 102 | 5.69 | 4.71 |
| 3021DGDs_sub.csv | 55 | 20.50 | 102 | 8.85 | 12.60 |
| 3023DGDt_sub.csv | 55 | 20.25 | 101 | 1.13 | 10.55 |
| 3025DGDs_sub.csv | 55 | 20.50 | 102 | 1.89 | 1.81 |
| 3027DGDt_sub.csv | 55 | 21.00 | 102 | 0.29 | 12.96 |
| 3029DGDs_sub.csv | 55 | 21.25 | 103 | 0.03 | 15.78 |
| 3031DGDt_sub.csv | 55 | 21.50 | 105 | 2.98 | 13.00 |
| 3033DGDs_sub.csv | 55 | 21.00 | 110 | 5.48 | 4.77 |
| 3035DGDt_sub.csv | 55 | 20.50 | 108 | 2.26 | 10.76 |
| 3037DGDs_sub.csv | 55 | 20.50 | 111 | 22.04 | 5.14 |
| 3039DGDt_sub.csv | 55 | 20.75 | 116 | 1.01 | 11.81 |
| 3041DGDs_sub.csv | 55 | 20.75 | 106 | 8.24 | 6.77 |
| 3043DGDt_sub.csv | 55 | 20.50 | 106 | 1.18 | 8.48 |

| *Filename* | *Calibration const (Ks)* | *Backscatter coefficient (S)* | *SSC factor bottom (%)* | *Distance to the left bank (m)* | *Distance to the right bank (m)* |
|---|---|---|---|---|---|
| 3045DGDs_sub.csv | 55 | 20.50 | 124 | 14.28 | 4.99 |
| 3047DGDt_sub.csv | 55 | 20.50 | 137 | 12.45 | 10.30 |
| 3049DGDs_sub.csv | 55 | 20.25 | 131 | 16.98 | 7.65 |
| 3051DGDt_sub.csv | 55 | 19.60 | 111 | 13.67 | 9.37 |
| 3053DGDt_sub.csv | 55 | 20.00 | 114 | 7.35 | 3.03 |
| 3055DGDt_sub.csv | 55 | 20.00 | 114 | 1.09 | 10.98 |
| 3057DGDs_sub.csv | 55 | 20.25 | 100 | 6.50 | 3.33 |
| 3059DGDt_sub.csv | 55 | 20.50 | 100 | 1.94 | 6.53 |
| 3061DGDs_sub.csv | 55 | 20.50 | 109 | 8.39 | 2.49 |
| 3063DGDt_sub.csv | 55 | 20.75 | 109 | 0.44 | 9.26 |
| 3065DGDt_sub.csv | 55 | 21.00 | 104 | 1.01 | 0.15 |
| 3067DGDt_sub.csv | 55 | 21.00 | 126 | 1.58 | 11.68 |
| 3069DGDs_sub.csv | 55 | 21.00 | 124 | 1.93 | 4.35 |
| 3071DGDt_sub.csv | 55 | 21.00 | 103 | 0.35 | 9.26 |
| 3073DGDs_sub.csv | 55 | 20.50 | 105 | 1.76 | 1.29 |
| 3075DGDt_sub.csv | 55 | 20.50 | 102 | 4.32 | 15.98 |
| 3077DGDs_sub.csv | 55 | 21.00 | 102 | 1.74 | 0.18 |
| 3079DGDt_sub.csv | 55 | 20.75 | 102 | 1.71 | 4.62 |
| 3081DGDs_sub.csv | 55 | 20.00 | 102 | 11.75 | 3.84 |
| 3083DGDt_sub.csv | 55 | 20.00 | 102 | 1.83 | 13.88 |
| 3085DGDs_sub.csv | 55 | 20.00 | 102 | 5.18 | 2.71 |
| 3087DGDt_sub.csv | 55 | 19.75 | 101 | 3.00 | 16.44 |
| 3089DGDs_sub.csv | 55 | 19.50 | 101 | 9.25 | 2.60 |
| 3091DGDt_sub.csv | 55 | 19.25 | 100 | 1.12 | 20.26 |
| 3093DGDs_sub.csv | 55 | 19.25 | 102 | 19.67 | 2.60 |
| 3095DGDt_sub.csv | 55 | 19.00 | 102 | 1.57 | 18.61 |
| 3097DGDt_sub.csv | 55 | 19.25 | 106 | 4.43 | 2.29 |
| 3099DGDt_sub.csv | 55 | 20.00 | 105 | 3.64 | 7.20 |
| 3101DGDs_sub.csv | 55 | 20.25 | 110 | 5.97 | 1.98 |
| 3103DGDt_sub.csv | 55 | 20.25 | 120 | 3.89 | 18.69 |

# APPENDIX G. CONTOURPLOTS OF FLOW VELOCITIES, SEDIMENT CONCENTRATION AND SEDIMENT FLUX PER SAILED TRANSECT

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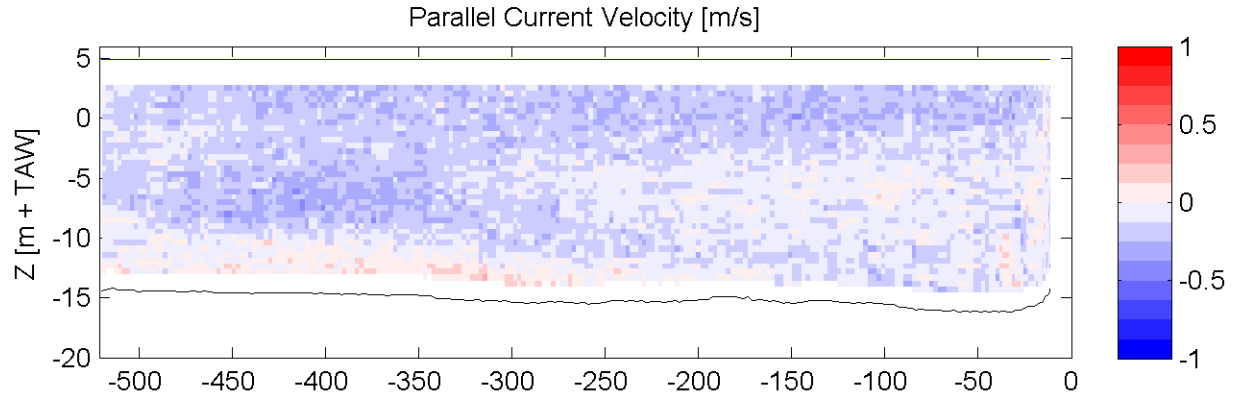
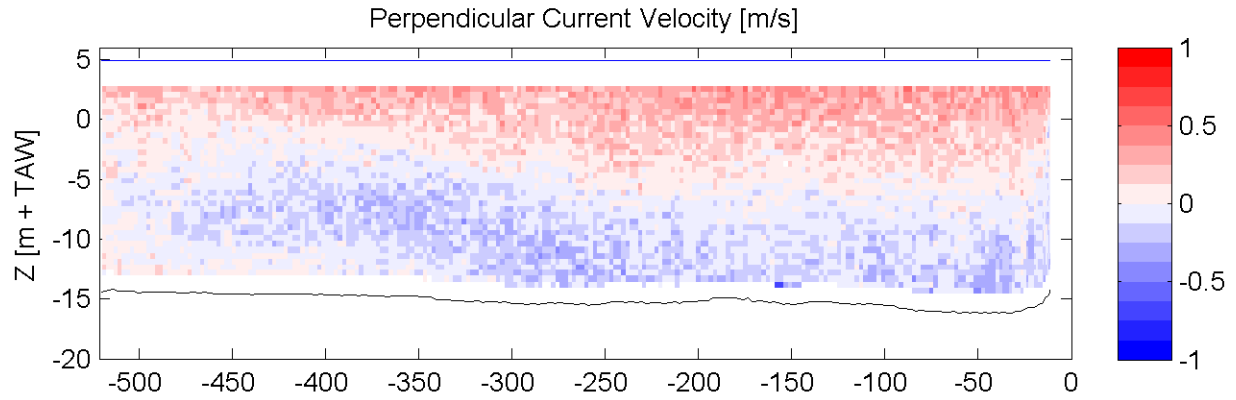
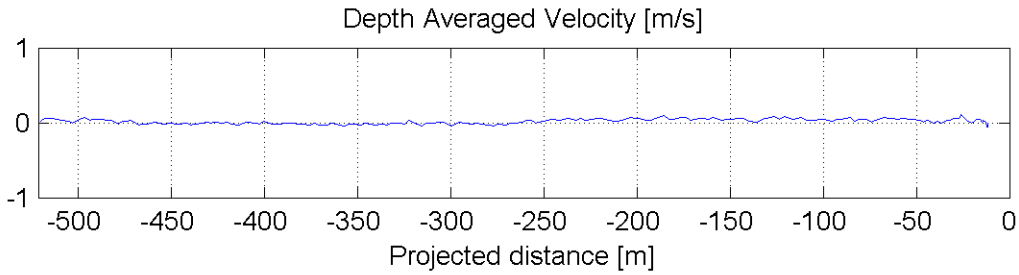
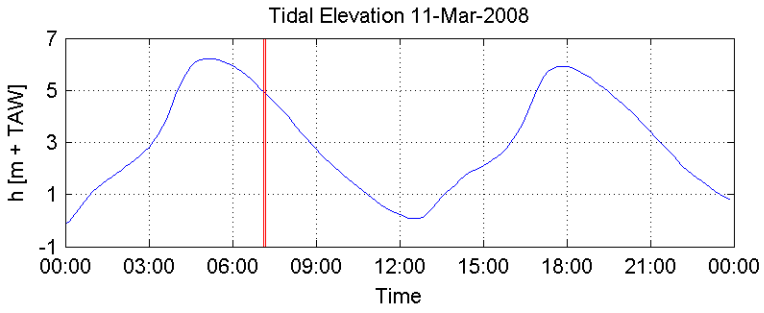
# Through Tide Sediview Measurement Spring tide 11/03/2008

| | |
|---|---|
| 11283 - Aanslibbing Deurganckdok | Equipment(s): ADCP |
| Sourcefile: 3003DGDt_sub.csv | Location: Transect DGD |




HW/LW:
05:00: h = 6.22 m+TAW
12:30: h = 0.08 m+TAW
17:50: h = 5.93 m+TAW

Date / Time [MET] :

11-Mar-2008

07:06 - 07:10

Time after HW [HH:MM]

2:08

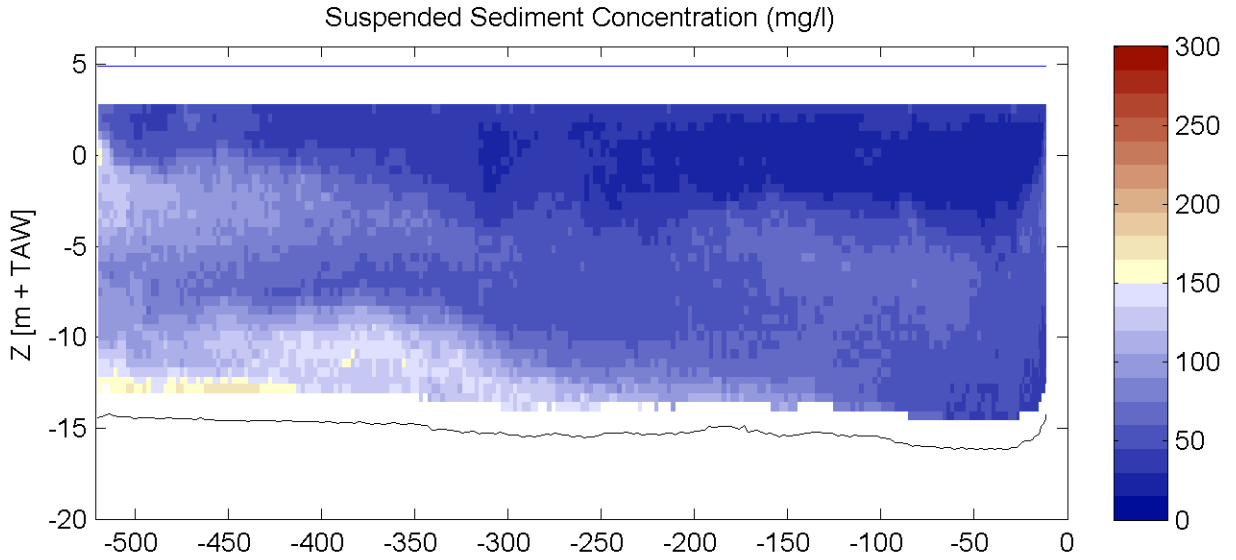
Data Processed by: IMDC

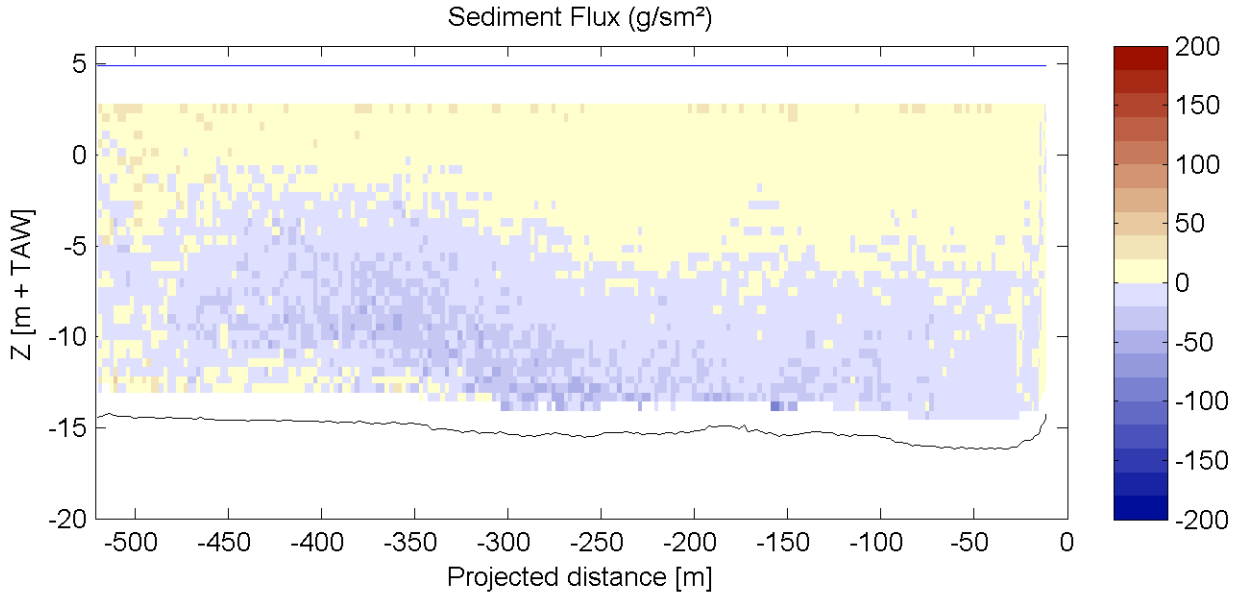
In association with : w.l | delft hydraulics, GEMS International

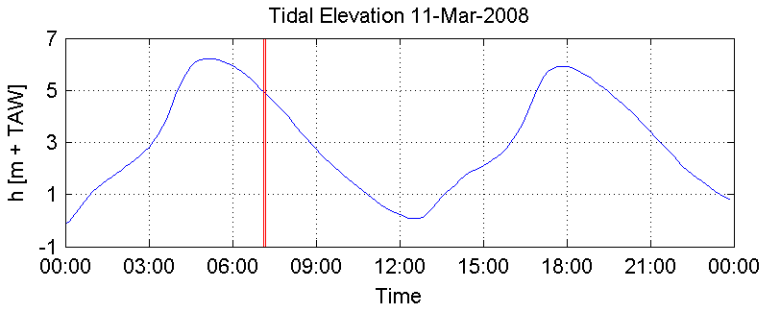
I/RA/11283/07.090/MSA

# Through Tide Sediview Measurement Spring tide 11/03/2008

| | |
|---|---|
| 11283 - Aanslibbing Deurganckdok | Equipment(s): ADCP |
| Sourcefile: 3003DGDt_sub.csv | Location: Transect DGD |




HW/LW:
05:00: h = 6.22 m+TAW
12:30: h = 0.08 m+TAW
17:50: h = 5.93 m+TAW

Date / Time [MET] :

11-Mar-2008

07:06 - 07:10

Time after HW [HH:MM]

2:08

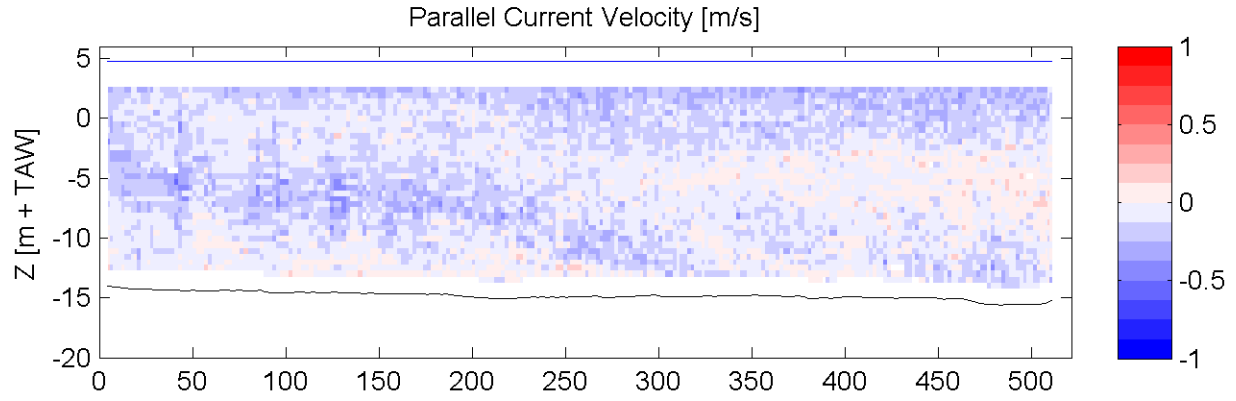
Data Processed by: IMDC

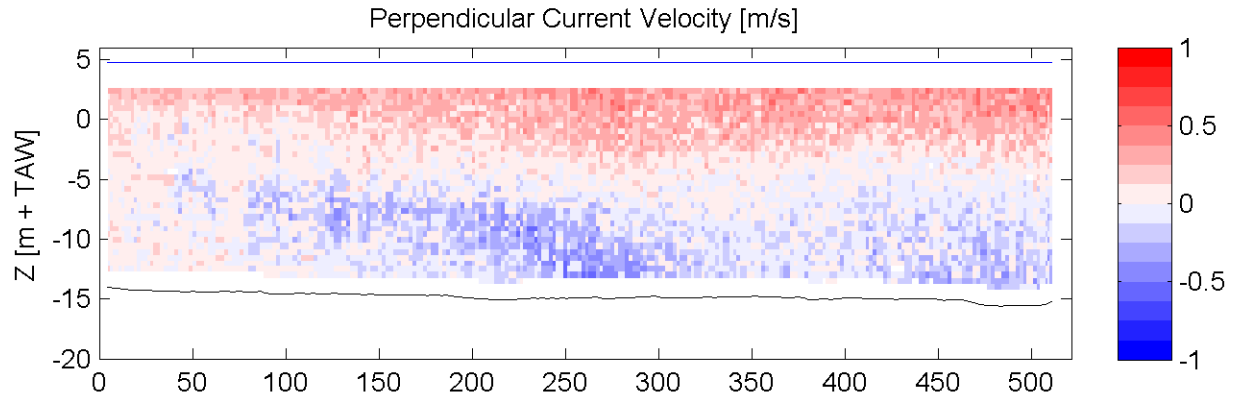
In association with : WL | delft hydraulics, GEMS International

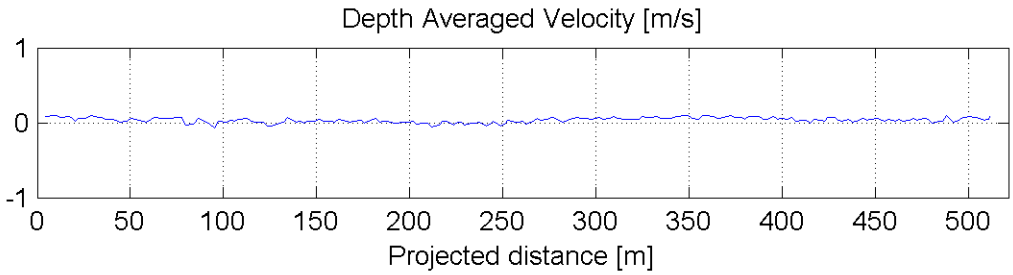
I/RA/11283/07.090/MSA

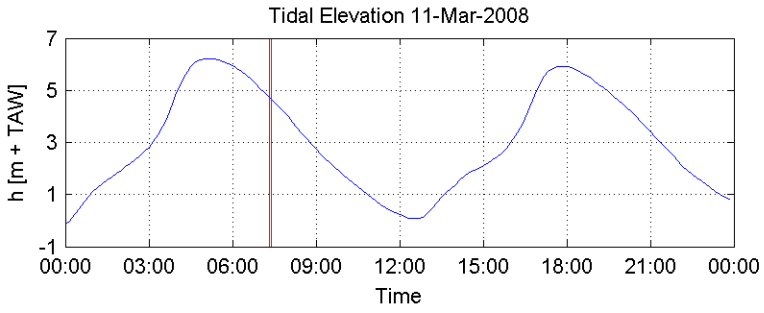
# Through Tide Sediview Measurement Spring tide 11/03/2008

| | |
|---|---|
| 11283 - Aanslibbing Deurganckdok | Equipment(s): ADCP |
| Sourcefile: 3005DGDs_sub.csv | Location: Transect DGD |




HW/LW:
05:00: h = 6.22 m+TAW
12:30: h = 0.08 m+TAW
17:50: h = 5.93 m+TAW

Date / Time [MET] :

11-Mar-2008

07:19 - 07:23

Time after HW [HH:MM]

2:21

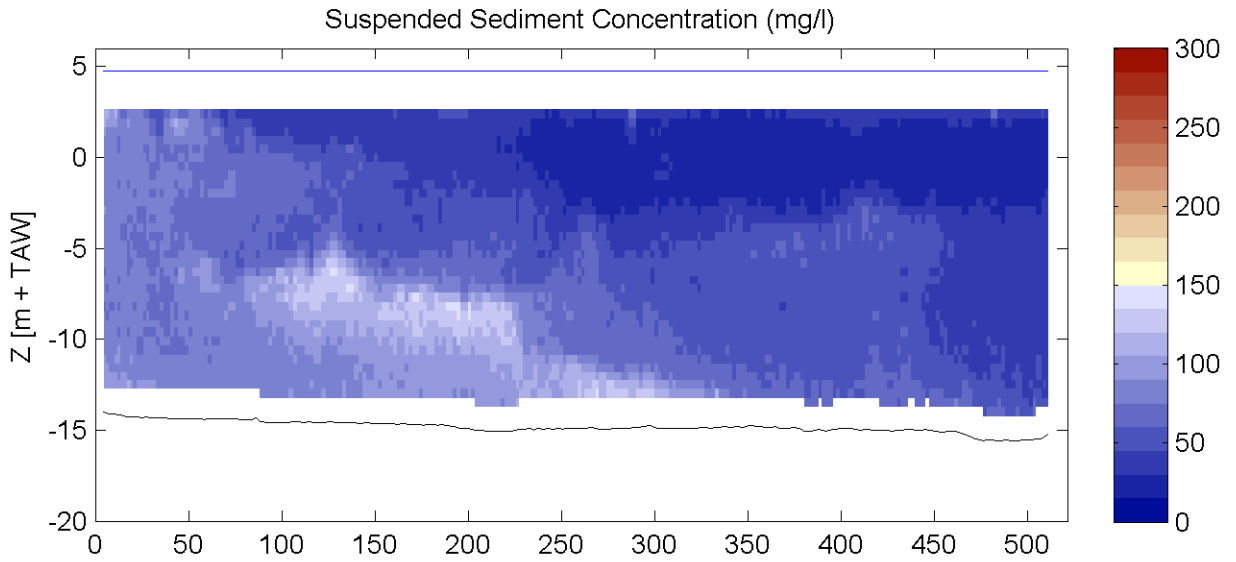
Data Processed by: IMDC

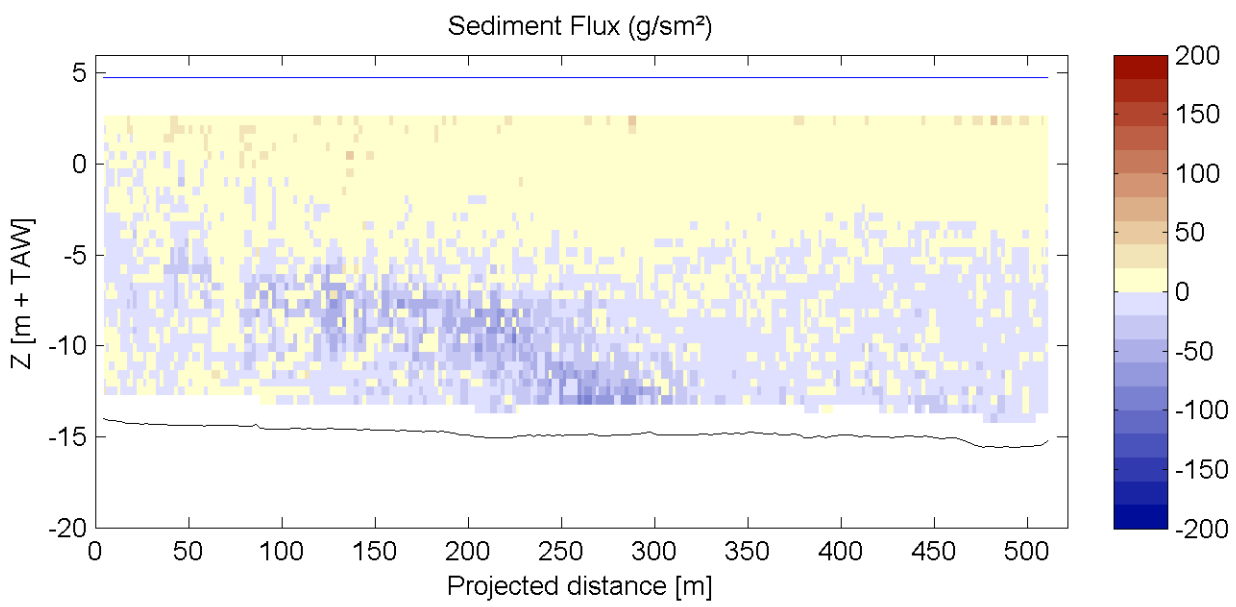
In association with : WL | delft hydraulics, GEMS International

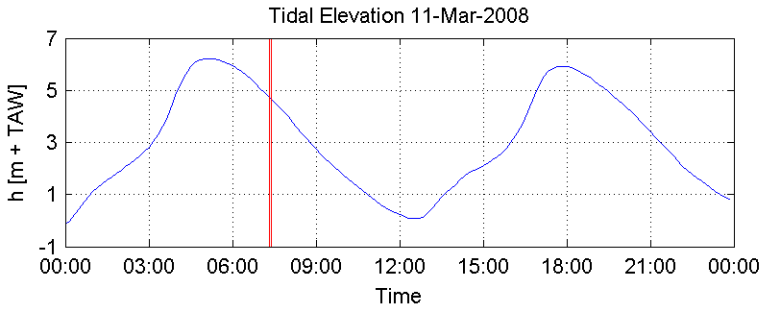
I/RA/11283/07.090/MSA

# Through Tide Sediview Measurement Spring tide 11/03/2008

| | |
|---|---|
| 11283 - Aanslibbing Deurganckdok | Equipment(s): ADCP |
| Sourcefile: 3005DGDs_sub.csv | Location: Transect DGD |




HW/LW:
05:00: h = 6.22 m+TAW
12:30: h = 0.08 m+TAW
17:50: h = 5.93 m+TAW

Date / Time [MET] :

11-Mar-2008

07:19 - 07:23

Time after HW [HH:MM]

2:21

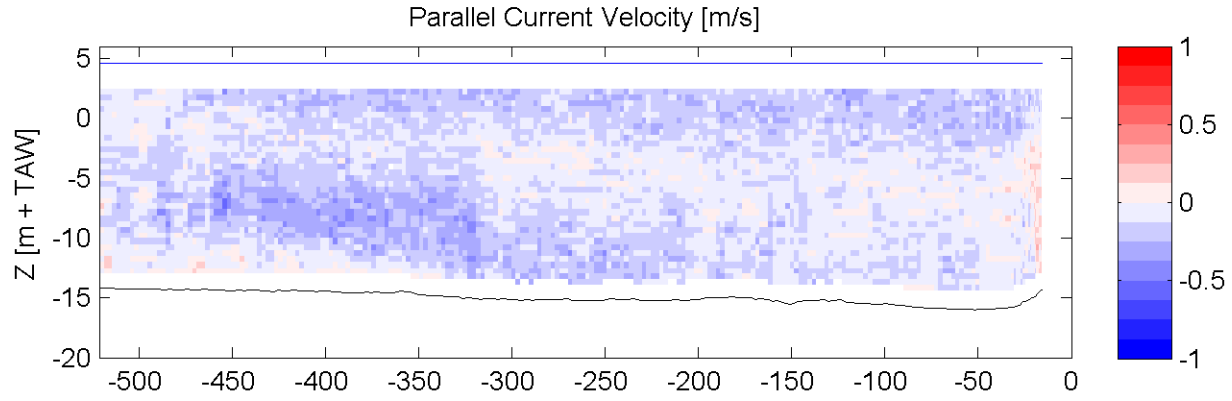
Data Processed by: IMDC

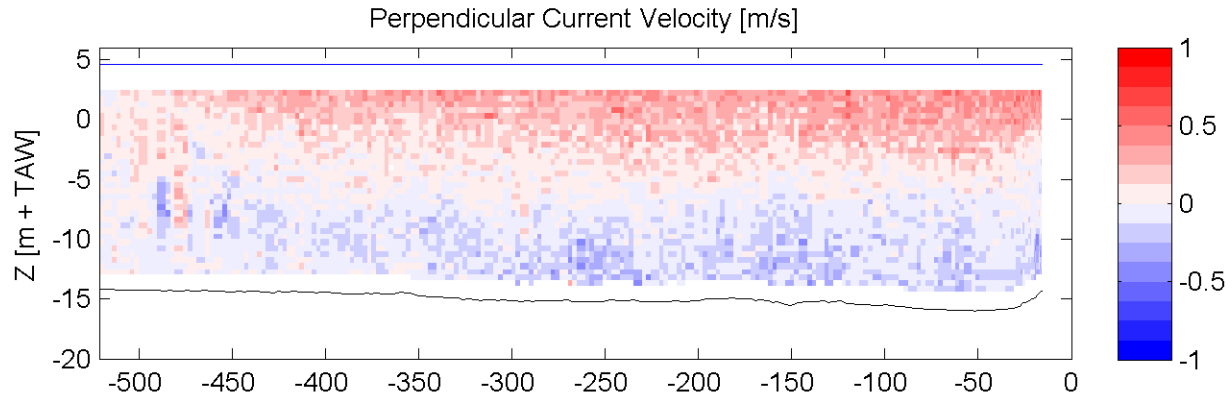
In association with : WL | delft hydraulics, GEMS International

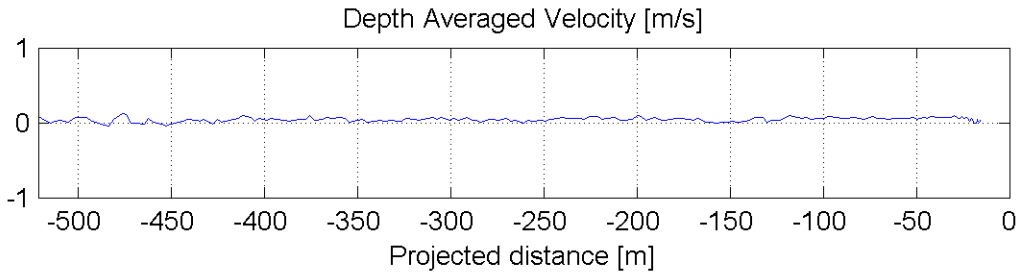
I/RA/11283/07.090/MSA

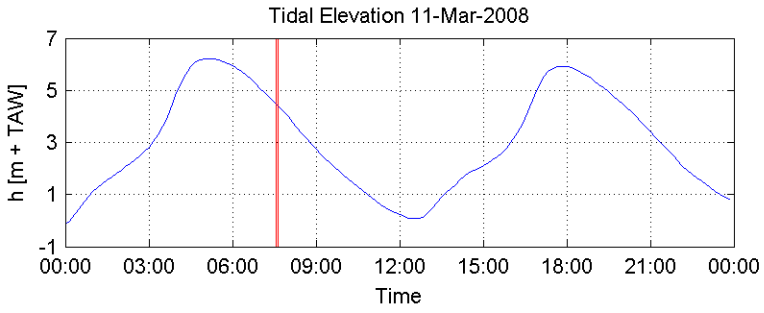
# Through Tide Sediview Measurement Spring tide 11/03/2008

| | |
|---|---|
| 11283 - Aanslibbing Deurganckdok | Equipment(s): ADCP |
| Sourcefile: 3007DGDt_sub.csv | Location: Transect DGD |




HW/LW:
05:00: h = 6.22 m+TAW
12:30: h = 0.08 m+TAW
17:50: h = 5.93 m+TAW

Date / Time [MET] :

11-Mar-2008

07:34 - 07:38

Time after HW [HH:MM]

2:36

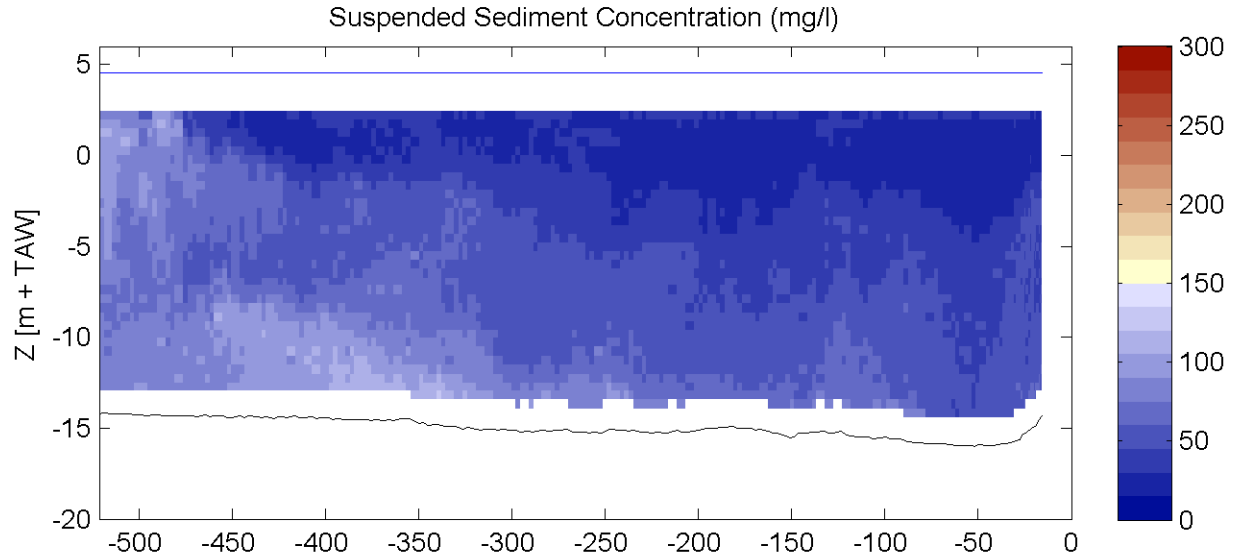
Data Processed by: IMDC

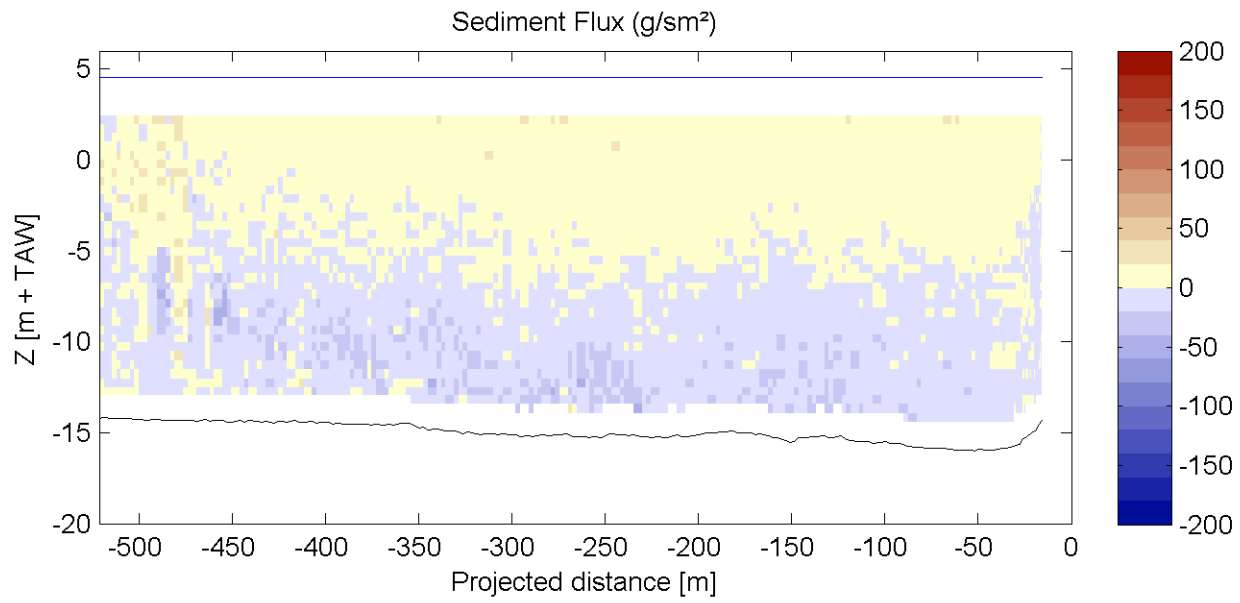
In association with : w.l | delft hydraulics, GEMS International

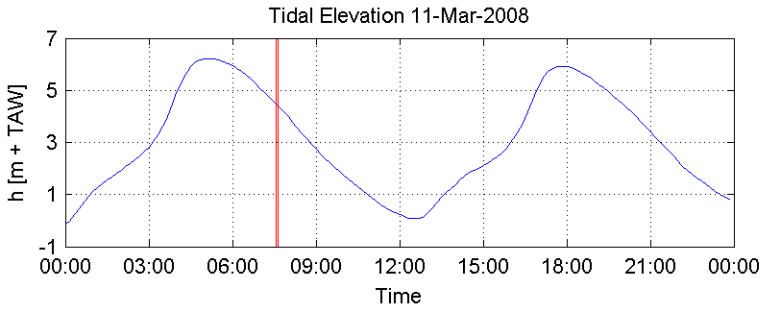
I/RA/11283/07.090/MSA

# Through Tide Sediview Measurement Spring tide 11/03/2008

| | |
|---|---|
| 11283 - Aanslibbing Deurganckdok | Equipment(s): ADCP |
| Sourcefile: 3007DGDt_sub.csv | Location: Transect DGD |




HW/LW:
05:00: h = 6.22 m+TAW
12:30: h = 0.08 m+TAW
17:50: h = 5.93 m+TAW

Date / Time [MET] :

11-Mar-2008

07:34 - 07:38

Time after HW [HH:MM]

2:36

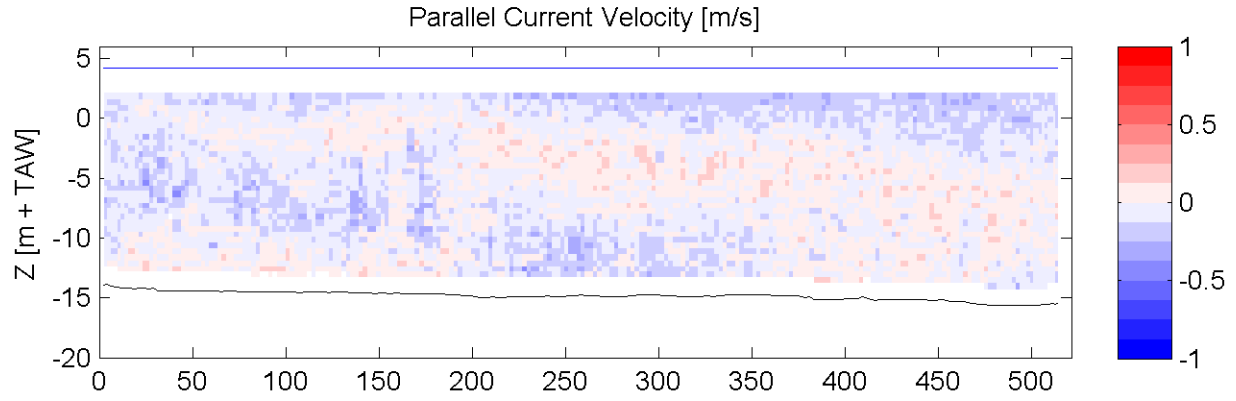
Data Processed by: IMDC

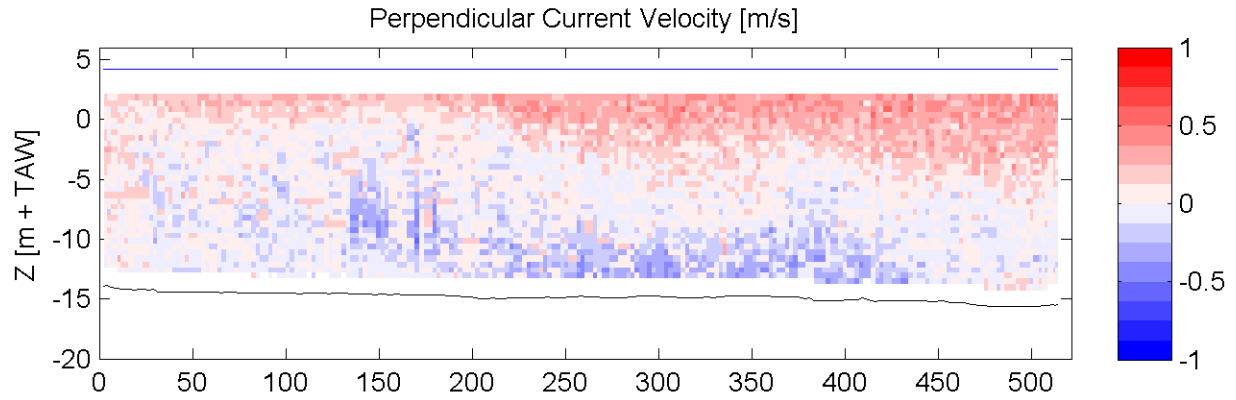
In association with : WL | delft hydraulics, GEMS International

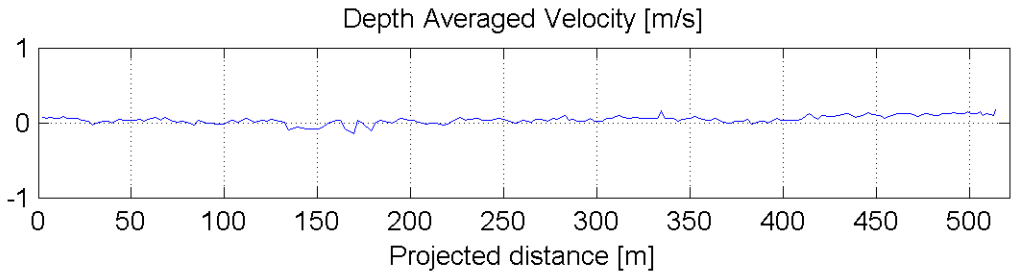
I/RA/11283/07.090/MSA

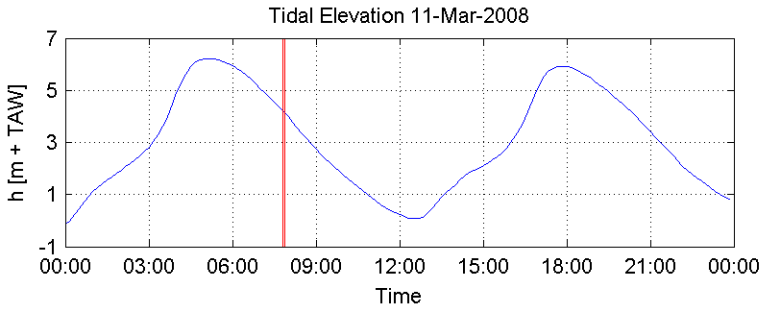
# Through Tide Sediview Measurement Spring tide 11/03/2008

| | |
|---|---|
| 11283 - Aanslibbing Deurganckdok | Equipment(s): ADCP |
| Sourcefile: 3009DGDs_sub.csv | Location: Transect DGD |




HW/LW:
05:00: h = 6.22 m+TAW
12:30: h = 0.08 m+TAW
17:50: h = 5.93 m+TAW

Date / Time [MET] :

11-Mar-2008

07:49 - 07:52

Time after HW [HH:MM]

2:51

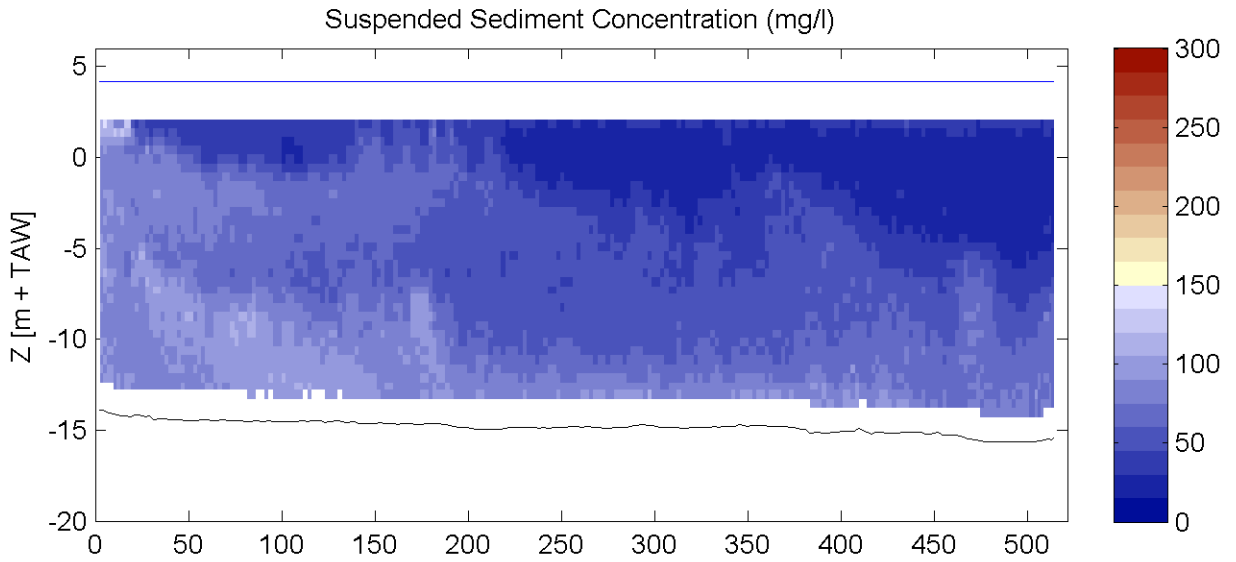
Data Processed by: IMDC

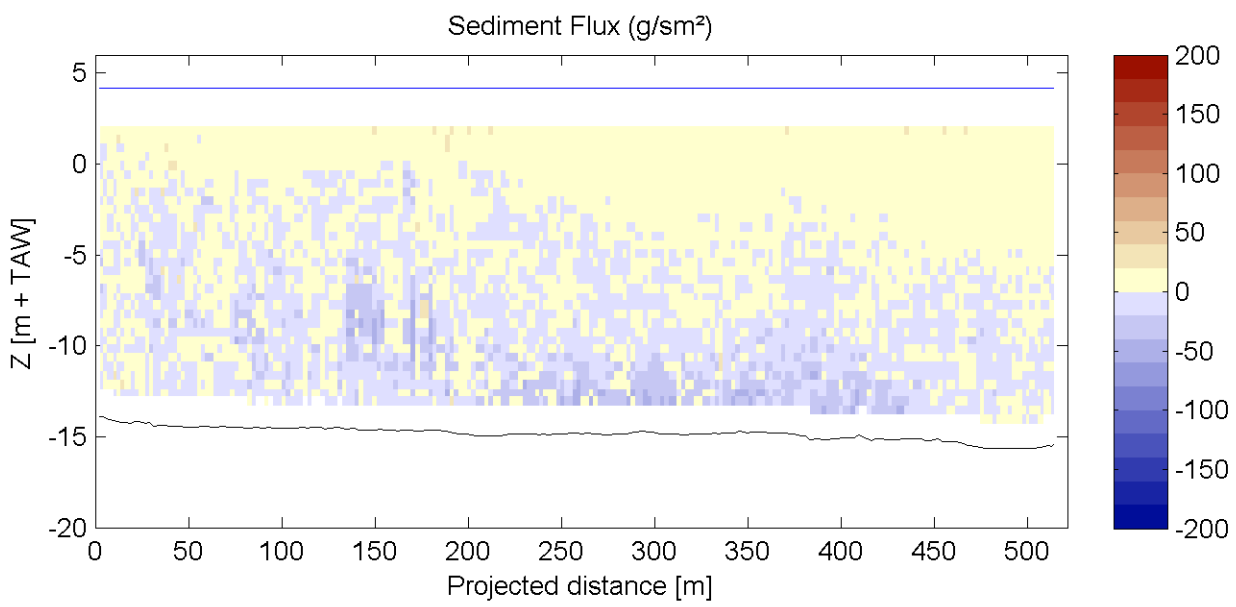
In association with : WL | delft hydraulics, GEMS International

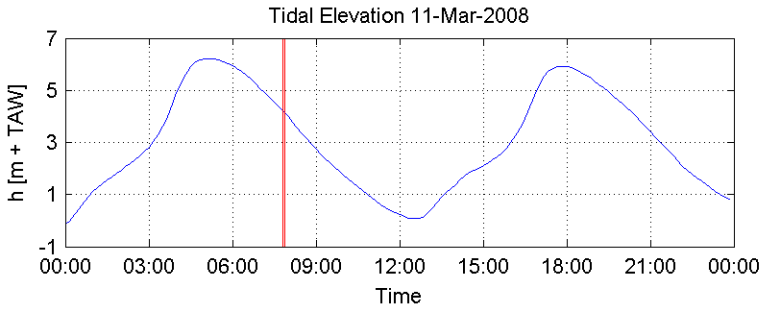
I/RA/11283/07.090/MSA

# Through Tide Sediview Measurement Spring tide 11/03/2008

| | |
|---|---|
| 11283 - Aanslibbing Deurganckdok | Equipment(s): ADCP |
| Sourcefile: 3009DGDs_sub.csv | Location: Transect DGD |




HW/LW:
05:00: h = 6.22 m+TAW
12:30: h = 0.08 m+TAW
17:50: h = 5.93 m+TAW

Date / Time [MET] :

11-Mar-2008

07:49 - 07:52

Time after HW [HH:MM]

2:51

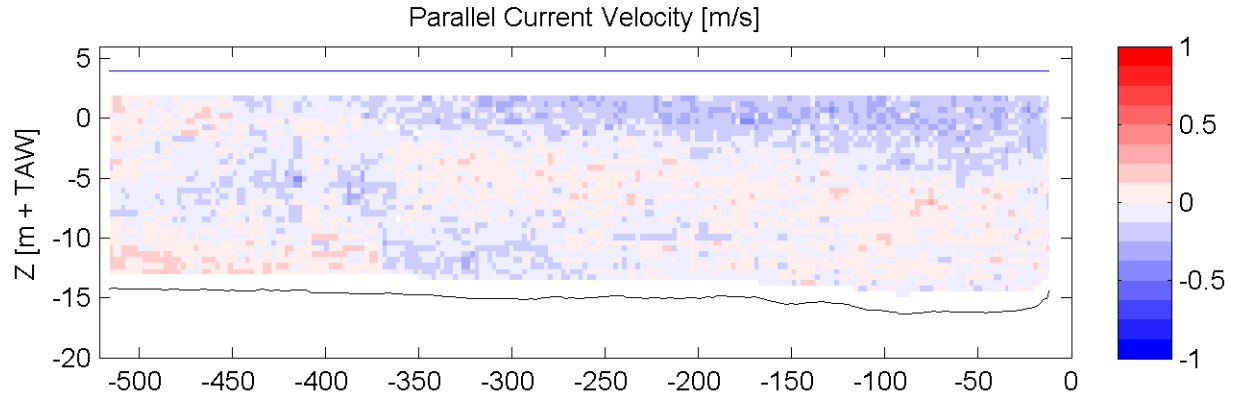
Data Processed by: IMDC

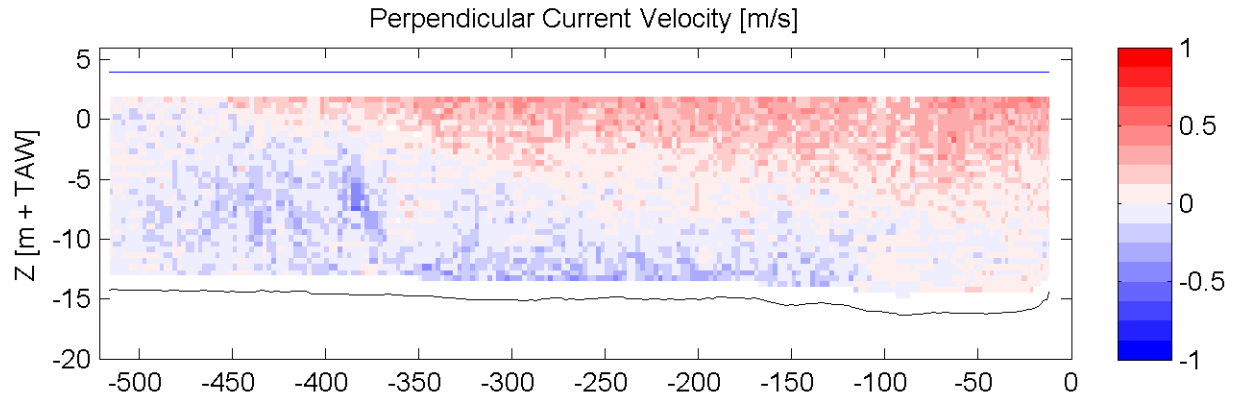
In association with : w.l | delft hydraulics, GEMS International

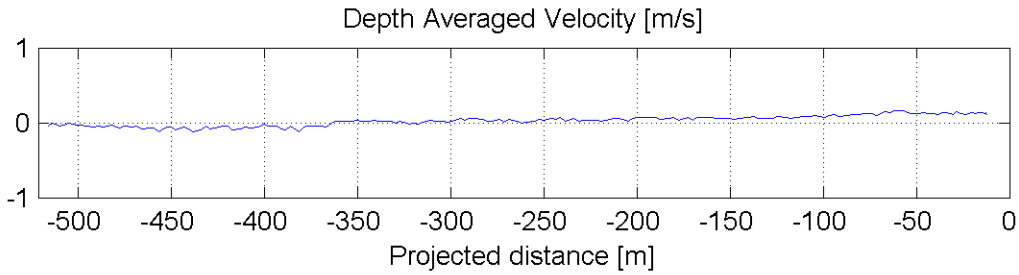
I/RA/11283/07.090/MSA

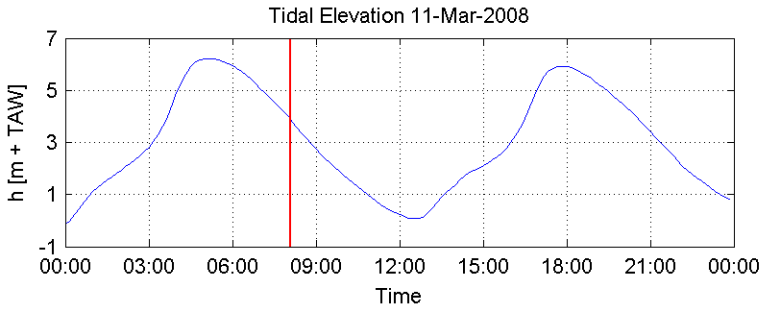
# Through Tide Sediview Measurement Spring tide 11/03/2008

| | |
|---|---|
| 11283 - Aanslibbing Deurganckdok | Equipment(s): ADCP |
| Sourcefile: 3011DGDt_sub.csv | Location: Transect DGD |




HW/LW:
05:00: h = 6.22 m+TAW
12:30: h = 0.08 m+TAW
17:50: h = 5.93 m+TAW

Date / Time [MET] :
11-Mar-2008
08:02 - 08:05

Time after HW [HH:MM]
3:03

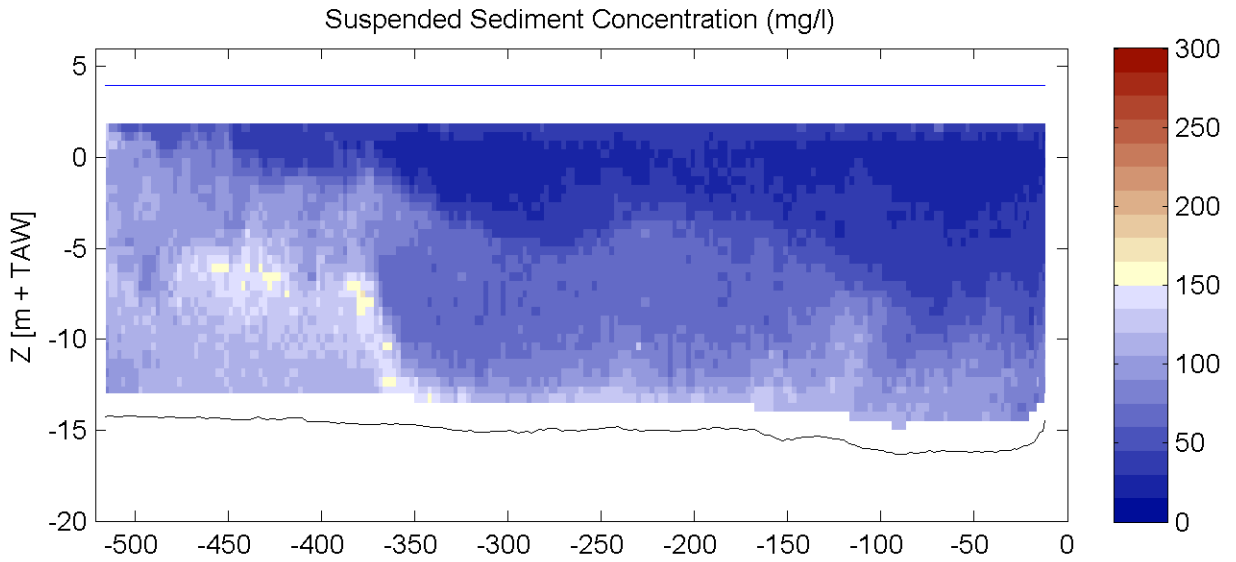
Data Processed by: IMDC

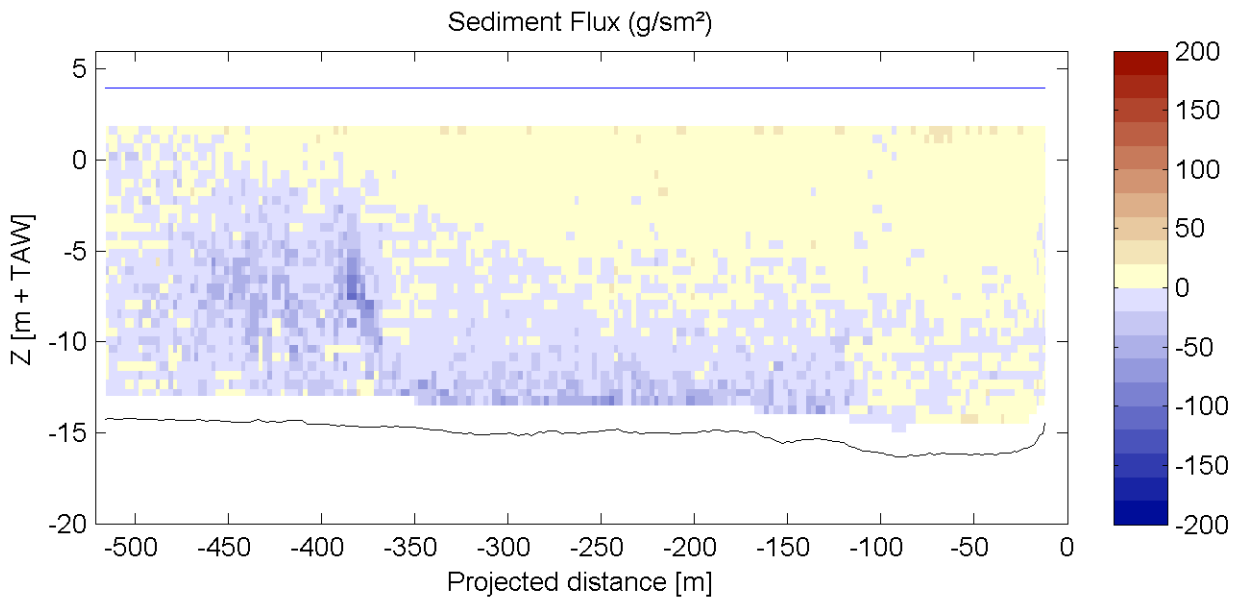
In association with : w.l | delft hydraulics, GEMS International

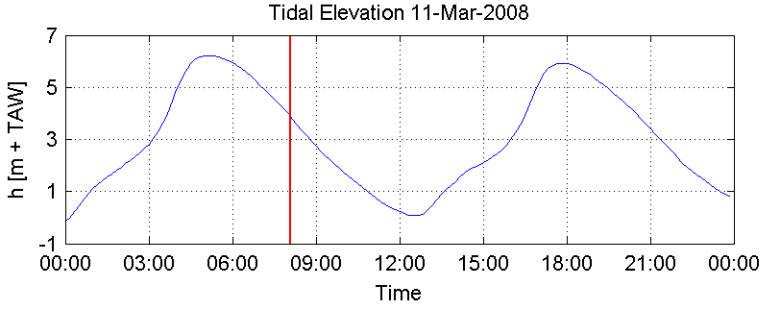
I/RA/11283/07.090/MSA

# Through Tide Sediview Measurement Spring tide 11/03/2008

| | |
|---|---|
| 11283 - Aanslibbing Deurganckdok | Equipment(s): ADCP |
| Sourcefile: 3011DGDt_sub.csv | Location: Transect DGD |




HW/LW: 05:00: h = 6.22 m+TAW
12:30: h = 0.08 m+TAW
17:50: h = 5.93 m+TAW

Date / Time [MET] :

11-Mar-2008

08:02 - 08:05

Time after HW [HH:MM]

3:03

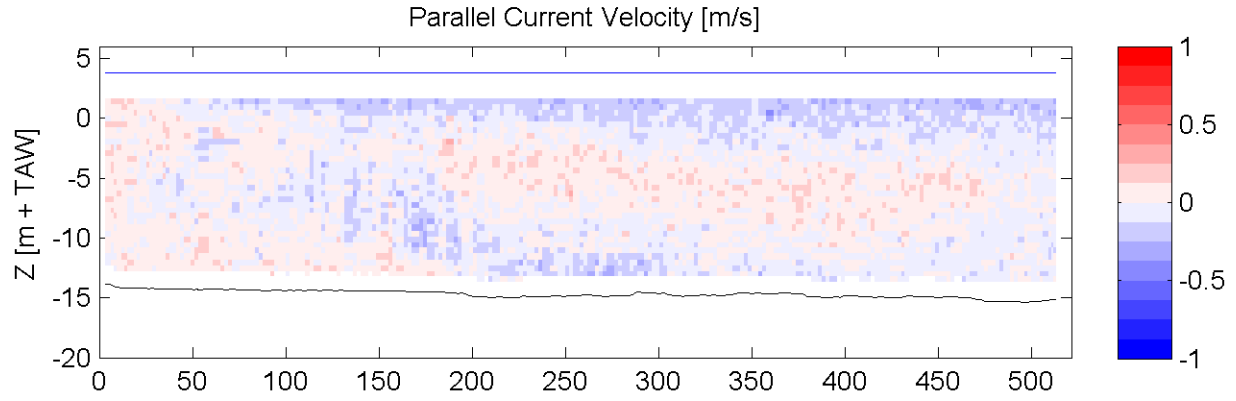
Data Processed by: IMDC

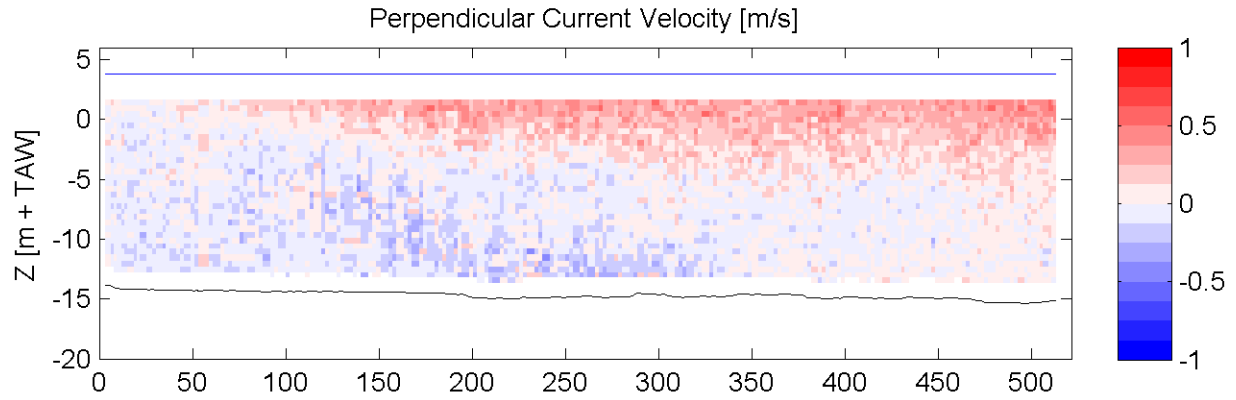
In association with : WL | delft hydraulics, GEMS International

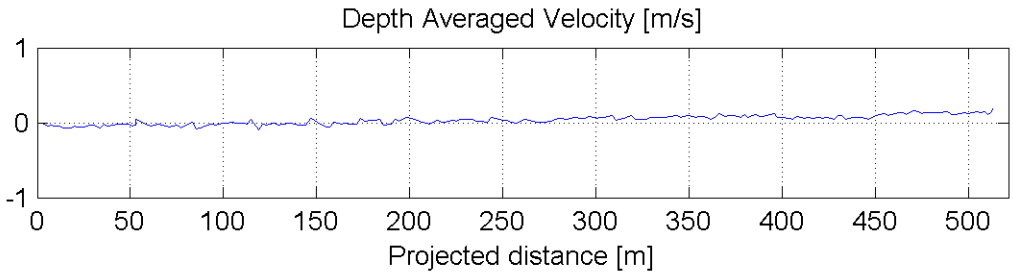
I/RA/11283/07.090/MSA

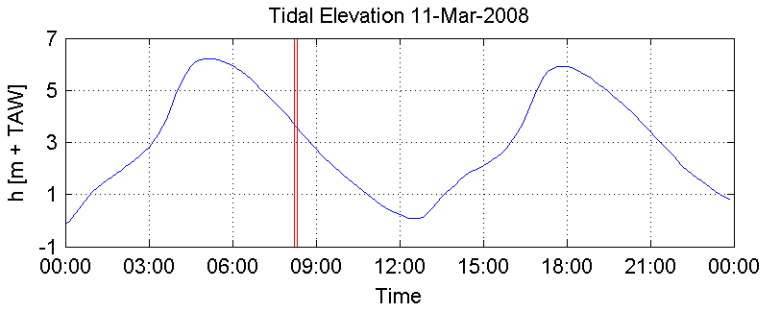
# Through Tide Sediview Measurement Spring tide 11/03/2008

| | |
|---|---|
| 11283 - Aanslibbing Deurganckdok | Equipment(s): ADCP |
| Sourcefile: 3013DGDs_sub.csv | Location: Transect DGD |




HW/LW:
05:00: h = 6.22 m+TAW
12:30: h = 0.08 m+TAW
17:50: h = 5.93 m+TAW

Date / Time [MET] :

11-Mar-2008

08:14 - 08:18

Time after HW [HH:MM]

3:16

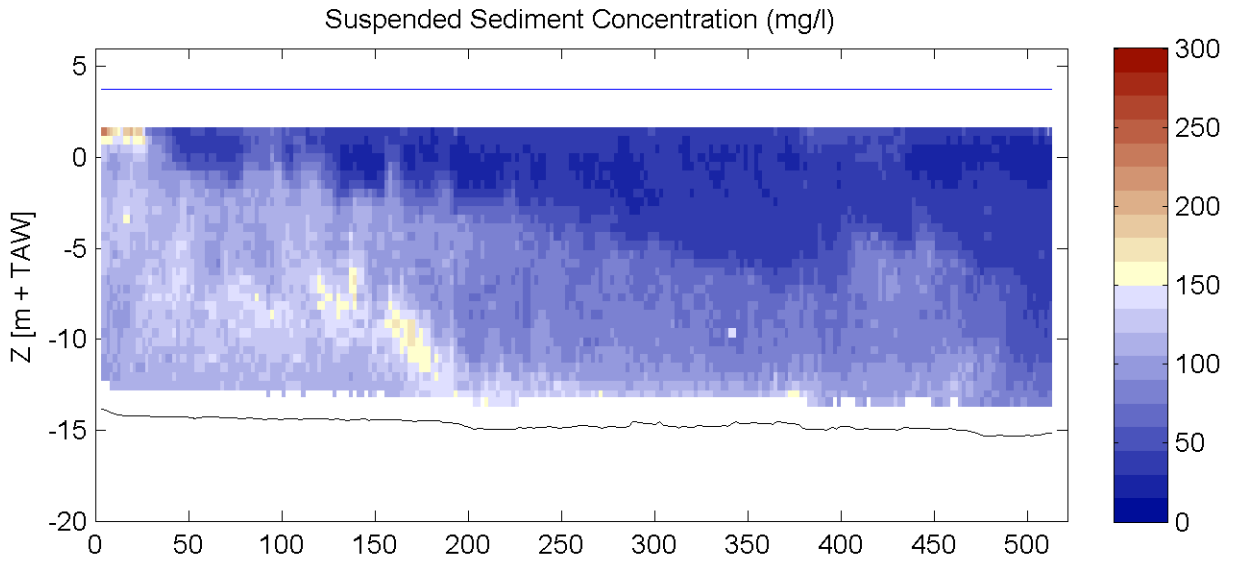
Data Processed by: IMDC

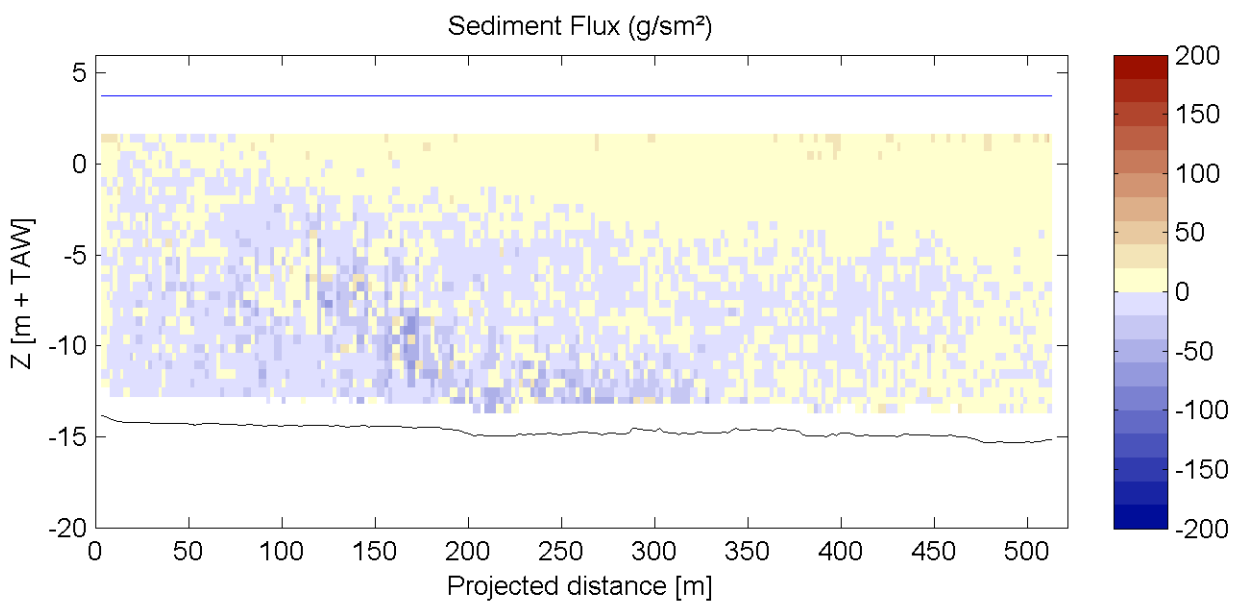
In association with : WL | delft hydraulics, GEMS International

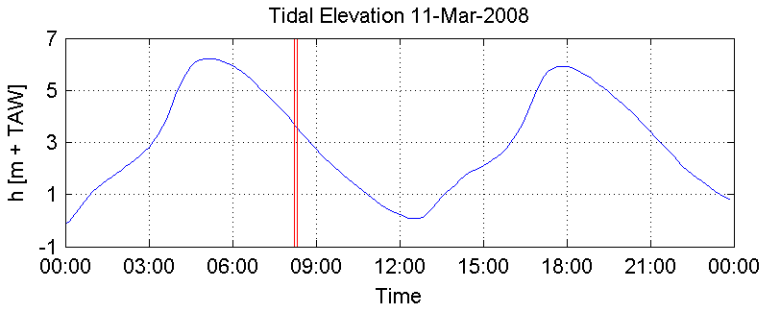
I/RA/11283/07.090/MSA

# Through Tide Sediview Measurement Spring tide 11/03/2008

| | |
|---|---|
| 11283 - Aanslibbing Deurganckdok | Equipment(s): ADCP |
| Sourcefile: 3013DGDs_sub.csv | Location: Transect DGD |




HW/LW:
05:00: h = 6.22 m+TAW
12:30: h = 0.08 m+TAW
17:50: h = 5.93 m+TAW

Date / Time [MET] :

11-Mar-2008

08:14 - 08:18

Time after HW [HH:MM]

3:16

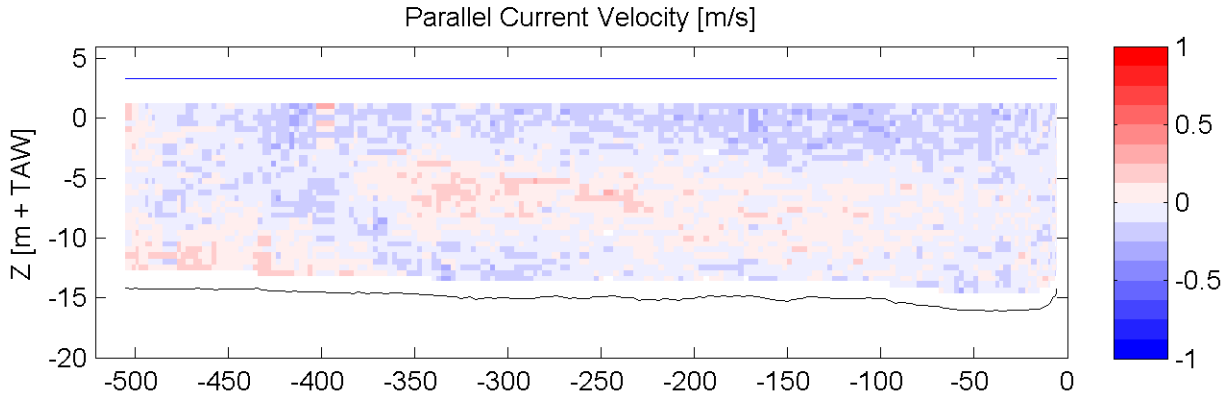
Data Processed by: IMDC

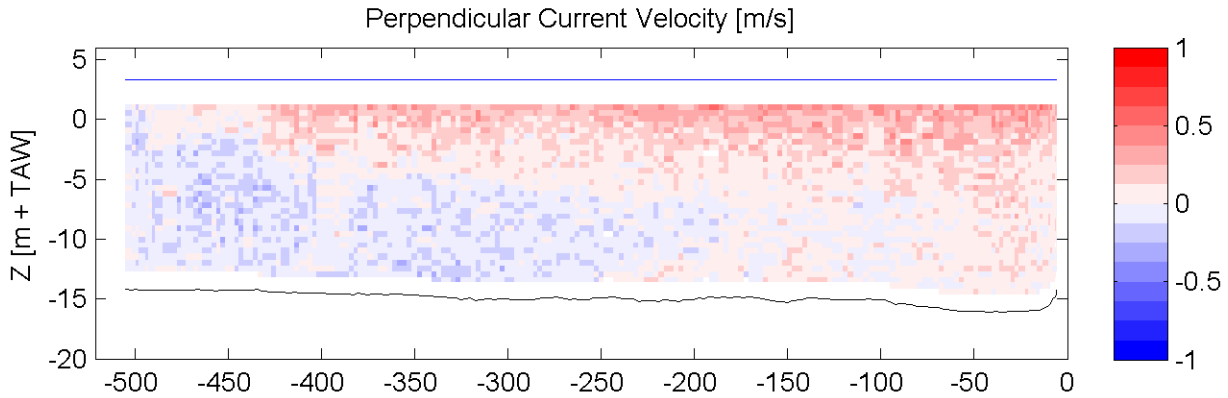
In association with : w.l | delft hydraulics, GEMS International

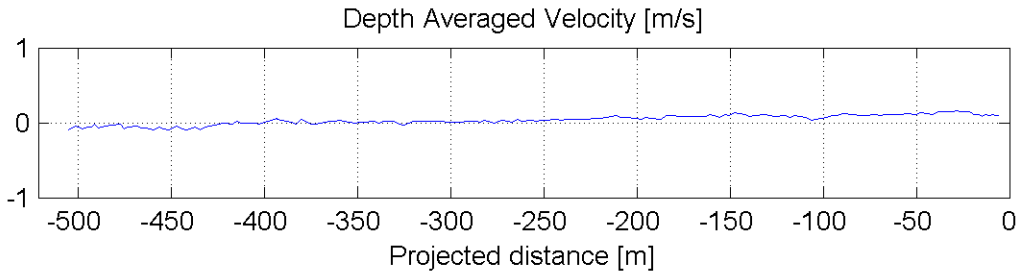
I/RA/11283/07.090/MSA

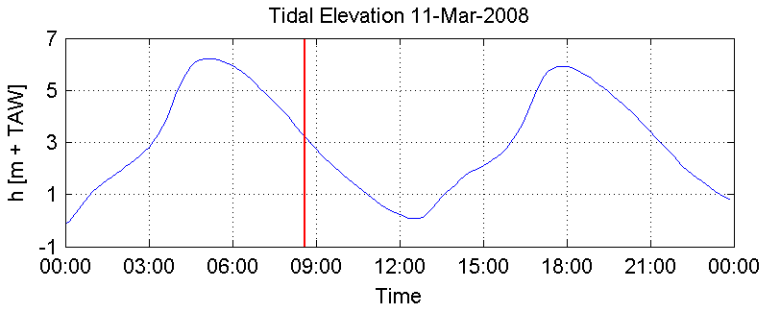
# Through Tide Sediview Measurement Spring tide 11/03/2008

| | |
|---|---|
| 11283 - Aanslibbing Deurganckdok | Equipment(s): ADCP |
| Sourcefile: 3015DGDt_sub.csv | Location: Transect DGD |




HW/LW: 05:00: h = 6.22 m+TAW
12:30: h = 0.08 m+TAW
17:50: h = 5.93 m+TAW

Date / Time [MET] :

11-Mar-2008

08:33 - 08:37

Time after HW [HH:MM]

3:35

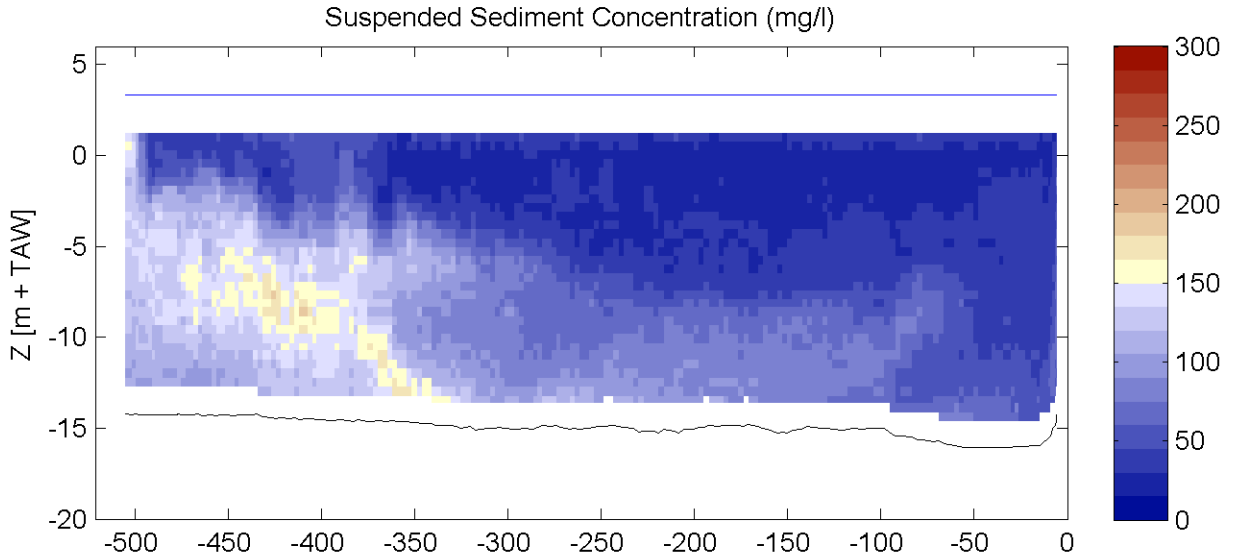
Data Processed by: IMDC

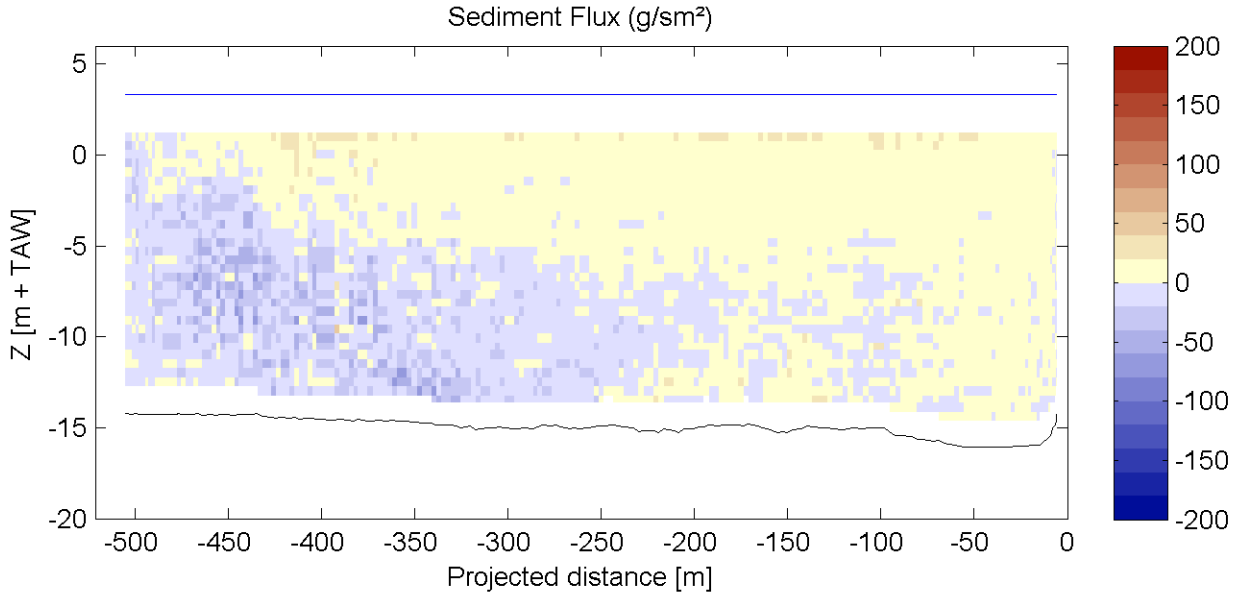
In association with : w.l | delft hydraulics, GEMS International

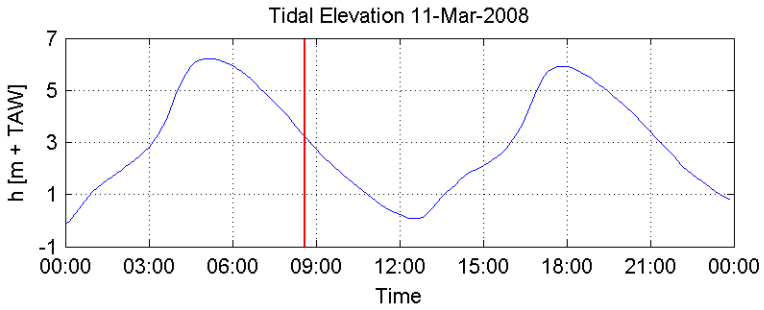
I/RA/11283/07.090/MSA

# Through Tide Sediview Measurement Spring tide 11/03/2008

| | |
|---|---|
| 11283 - Aanslibbing Deurganckdok | Equipment(s): ADCP |
| Sourcefile: 3015DGDt_sub.csv | Location: Transect DGD |




HW/LW:
05:00: h = 6.22 m+TAW
12:30: h = 0.08 m+TAW
17:50: h = 5.93 m+TAW

Date / Time [MET] :

11-Mar-2008

08:33 - 08:37

Time after HW [HH:MM]

3:35

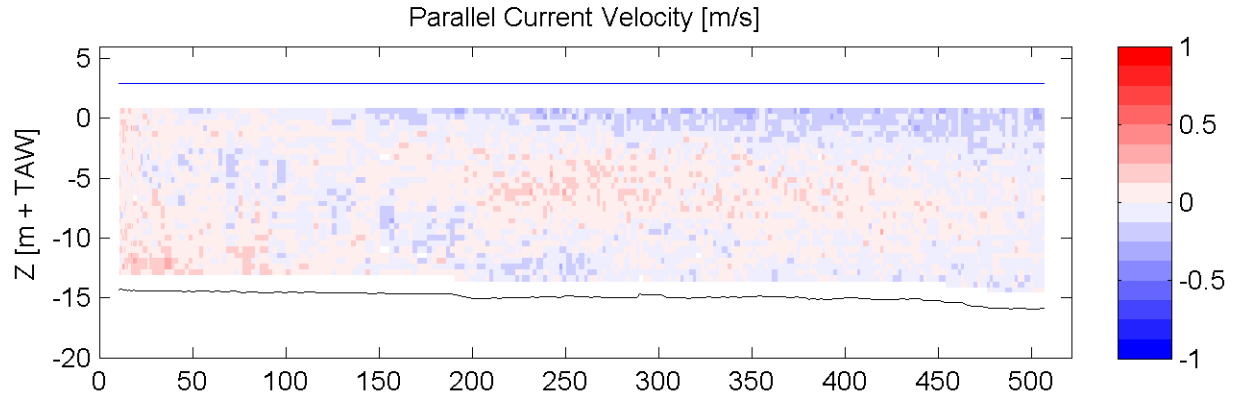
Data Processed by: IMDC

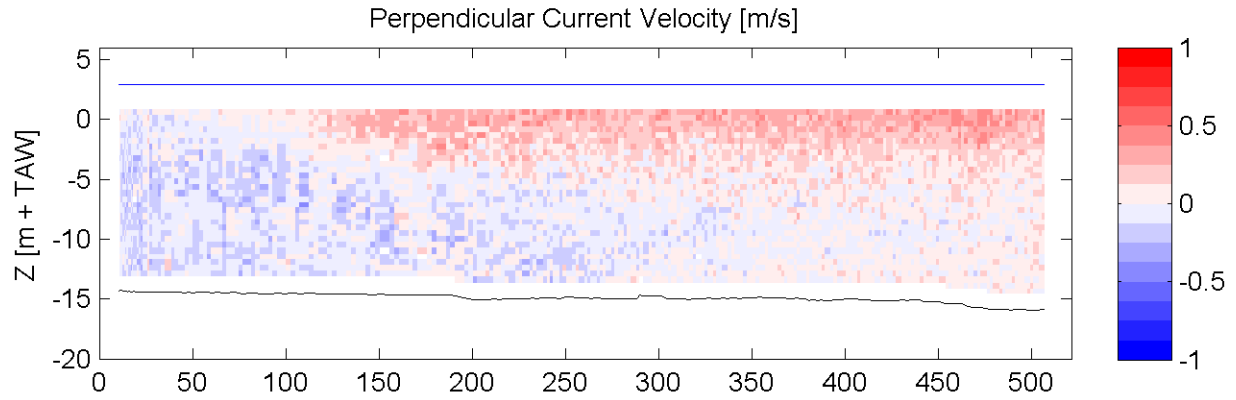
In association with : WL | delft hydraulics, GEMS International

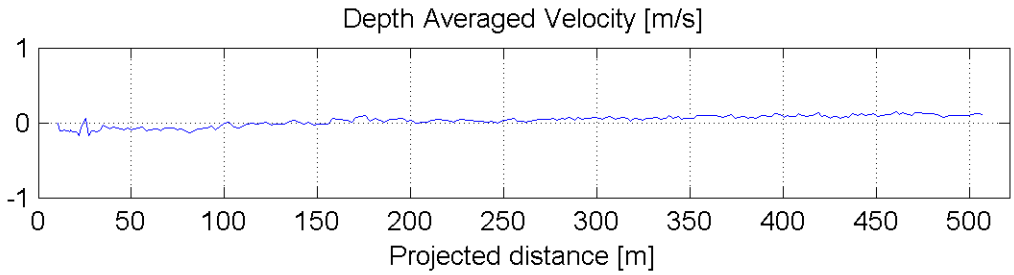
I/RA/11283/07.090/MSA

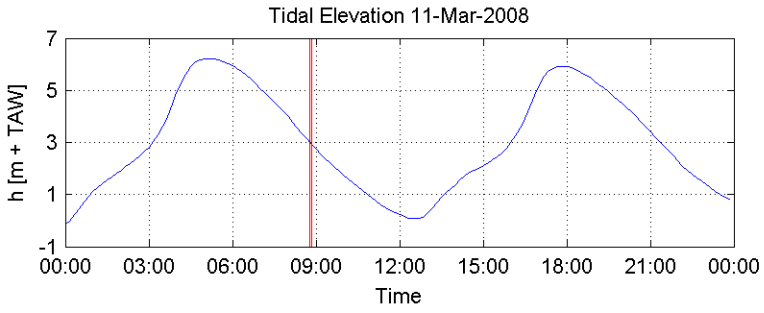
# Through Tide Sediview Measurement Spring tide 11/03/2008

| | |
|---|---|
| 11283 - Aanslibbing Deurganckdok | Equipment(s): ADCP |
| Sourcefile: 3017DGDs_sub.csv | Location: Transect DGD |




HW/LW:
05:00: h = 6.22 m+TAW
12:30: h = 0.08 m+TAW
17:50: h = 5.93 m+TAW

Date / Time [MET] :

11-Mar-2008

08:45 - 08:50

Time after HW [HH:MM]

3:47

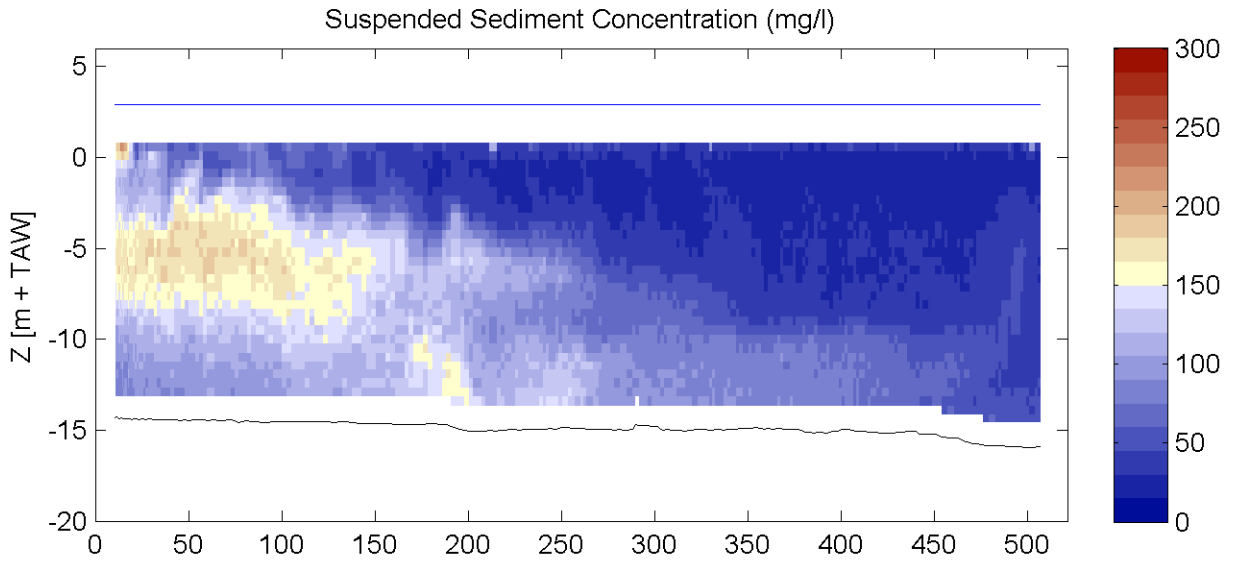
Data Processed by: IMDC

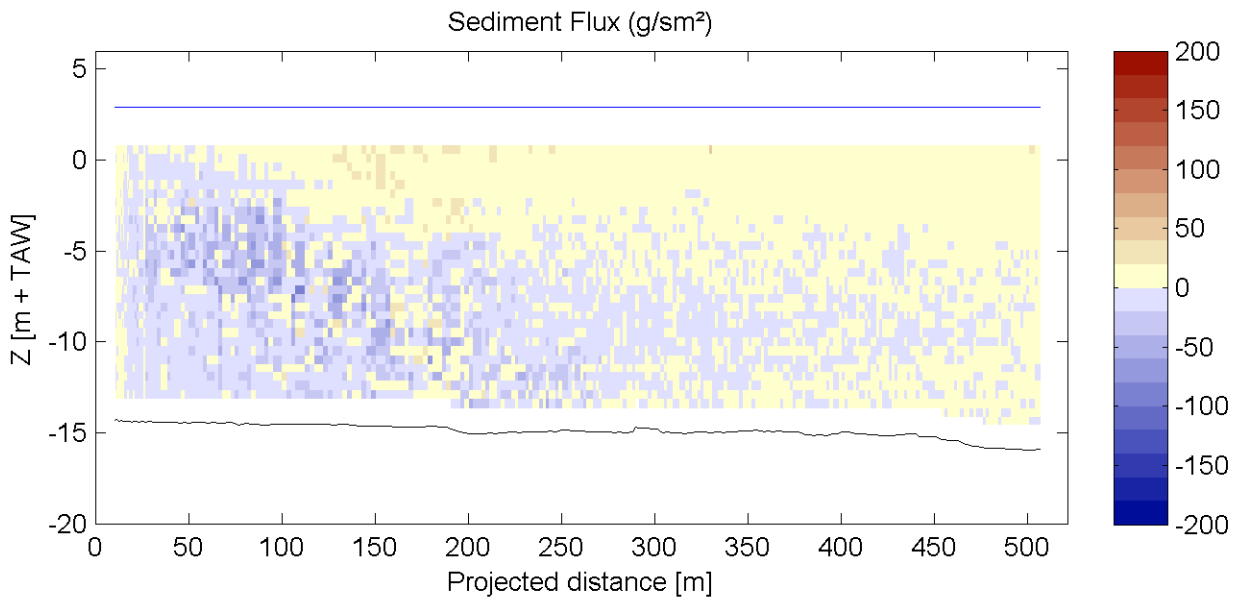
In association with : WL | delft hydraulics, GEMS International

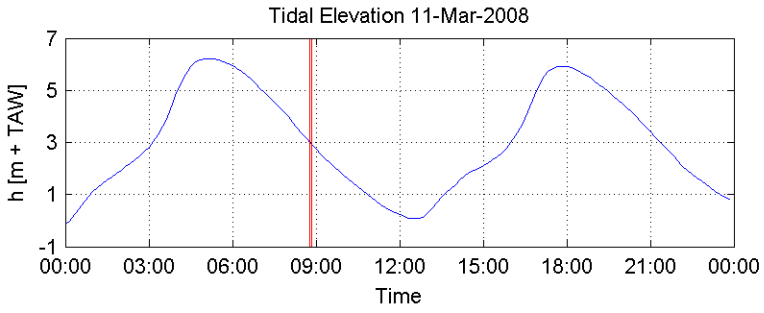
I/RA/11283/07.090/MSA

# Through Tide Sediview Measurement Spring tide 11/03/2008

| | |
|---|---|
| 11283 - Aanslibbing Deurganckdok | Equipment(s): ADCP |
| Sourcefile: 3017DGDs_sub.csv | Location: Transect DGD |




HW/LW:
05:00: h = 6.22 m+TAW
12:30: h = 0.08 m+TAW
17:50: h = 5.93 m+TAW

Date / Time [MET] :

11-Mar-2008

08:45 - 08:50

Time after HW [HH:MM]

3:47

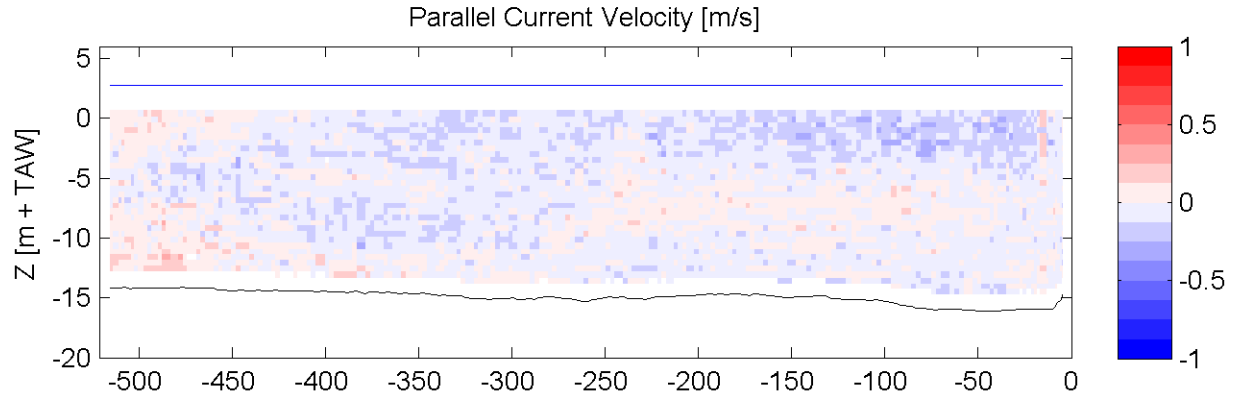
Data Processed by: IMDC

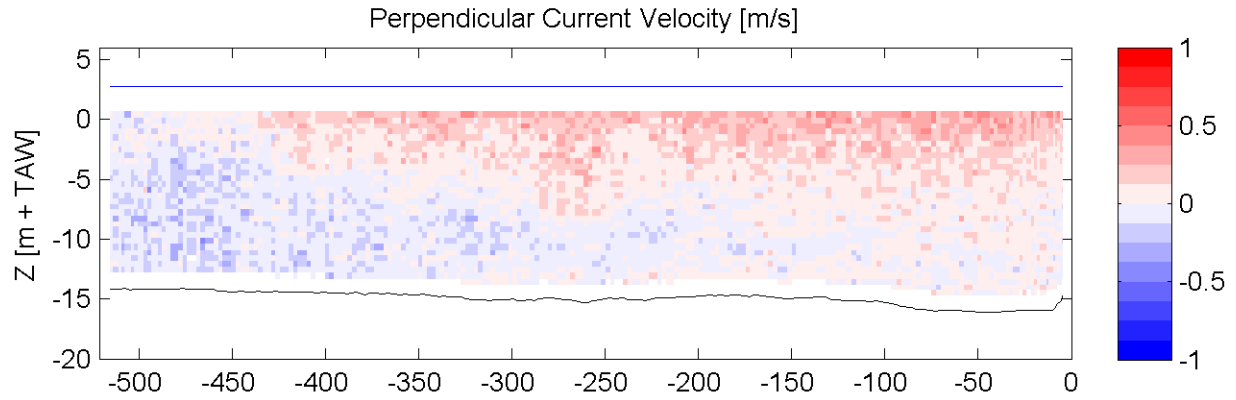
In association with : WL | delft hydraulics, GEMS International

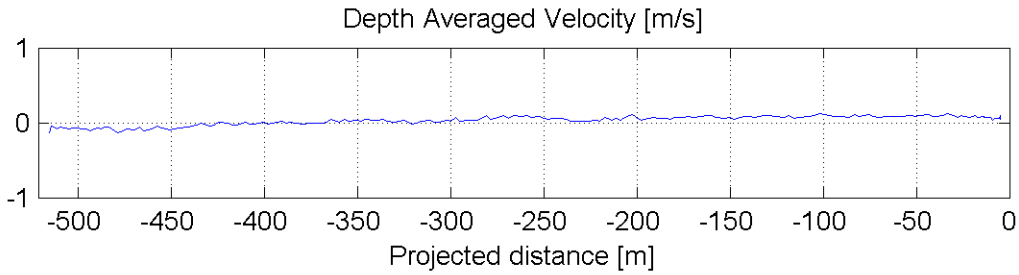
I/RA/11283/07.090/MSA

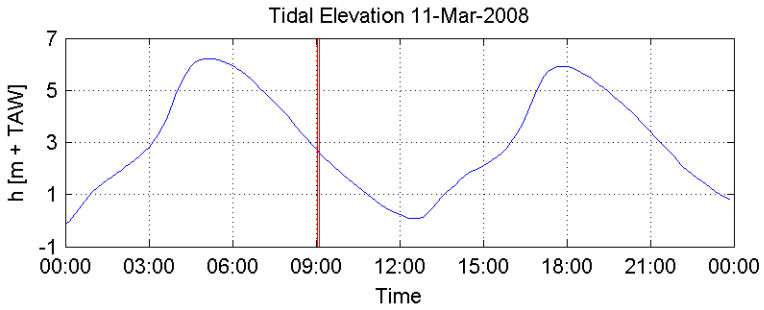
# Through Tide Sediview Measurement Spring tide 11/03/2008

| | |
|---|---|
| 11283 - Aanslibbing Deurganckdok | Equipment(s): ADCP |
| Sourcefile: 3019DGDt_sub.csv | Location: Transect DGD |




HW/LW: 05:00: h = 6.22 m+TAW
12:30: h = 0.08 m+TAW
17:50: h = 5.93 m+TAW

Date / Time [MET] :

11-Mar-2008

09:04 - 09:07

Time after HW [HH:MM]

4:05

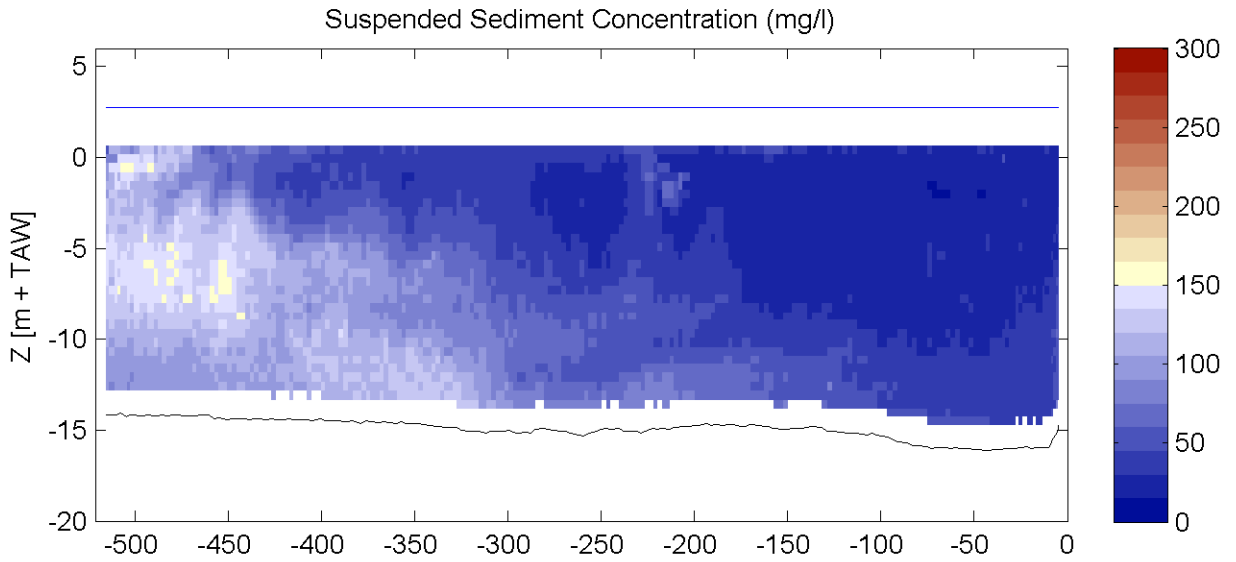
Data Processed by: IMDC

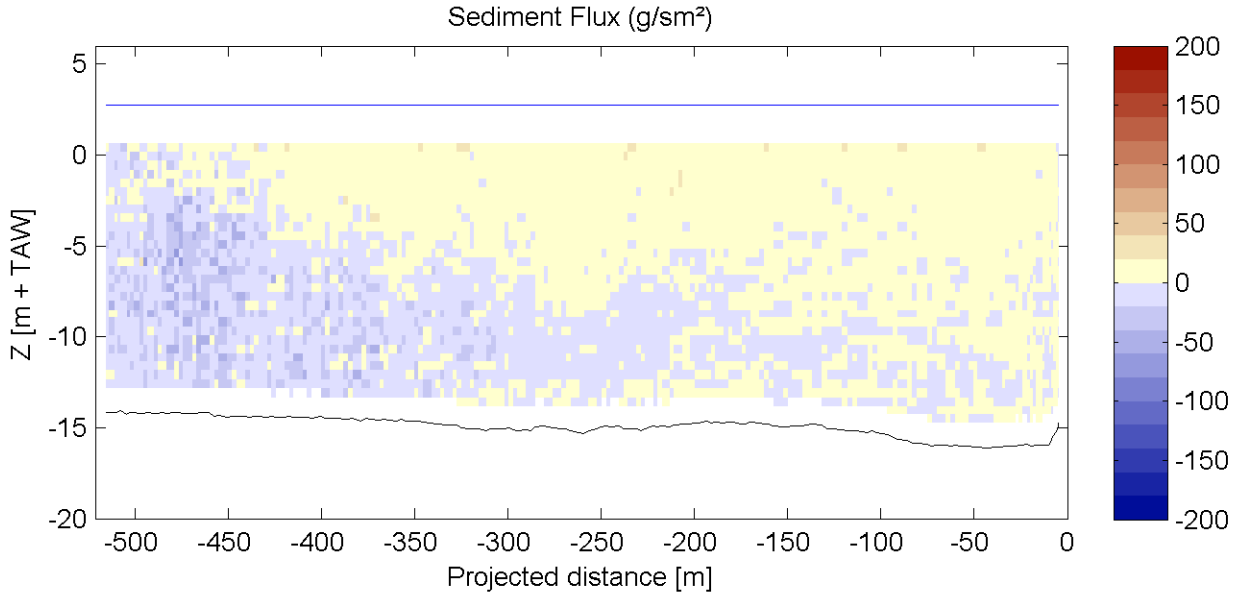
In association with : w.l | delft hydraulics, GEMS International

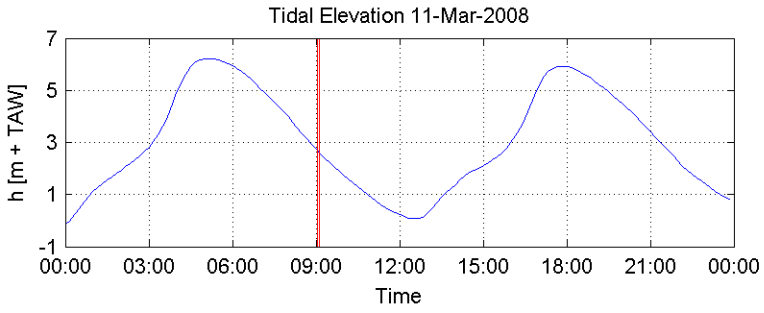
I/RA/11283/07.090/MSA

# Through Tide Sediview Measurement Spring tide 11/03/2008

| | |
|---|---|
| 11283 - Aanslibbing Deurganckdok | Equipment(s): ADCP |
| Sourcefile: 3019DGDt_sub.csv | Location: Transect DGD |




HW/LW: 05:00: h = 6.22 m+TAW
12:30: h = 0.08 m+TAW
17:50: h = 5.93 m+TAW

Date / Time [MET] :

11-Mar-2008

09:04 - 09:07

Time after HW [HH:MM]

4:05

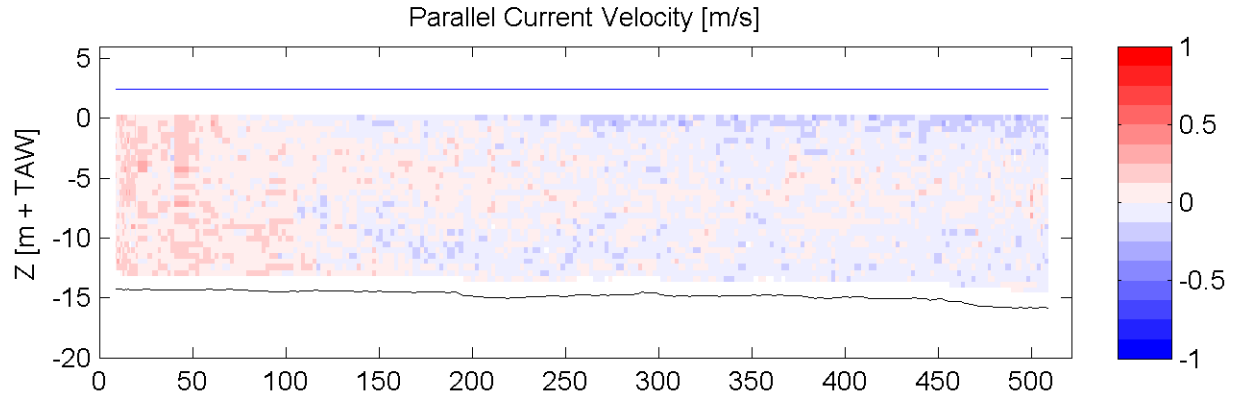
Data Processed by: IMDC

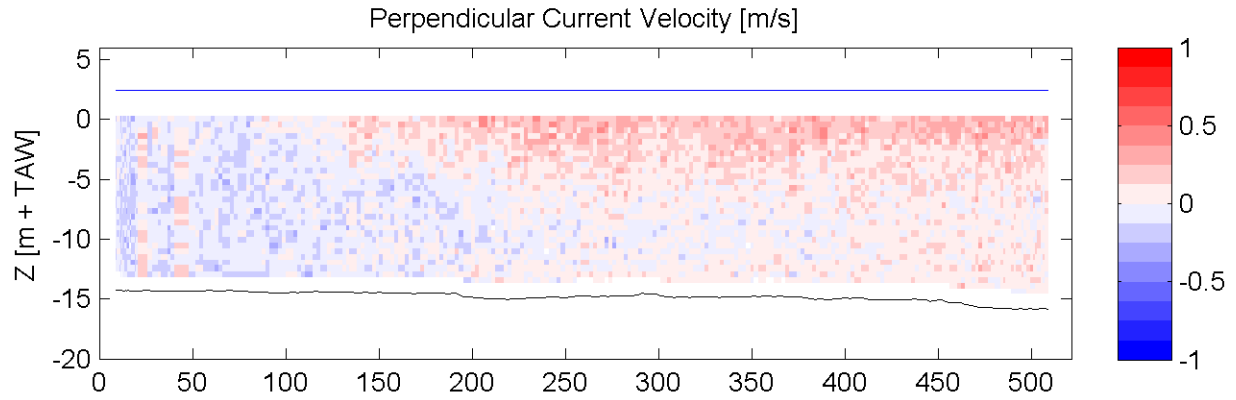
In association with : WL | delft hydraulics, GEMS International

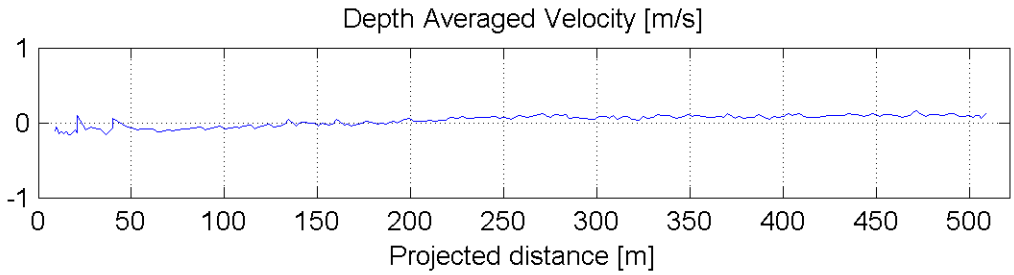
I/RA/11283/07.090/MSA

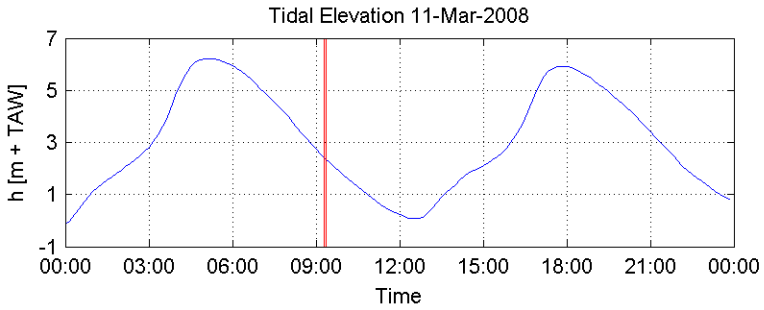
# Through Tide Sediview Measurement Spring tide 11/03/2008

| | |
|---|---|
| 11283 - Aanslibbing Deurganckdok | Equipment(s): ADCP |
| Sourcefile: 3021DGDs_sub.csv | Location: Transect DGD |




HW/LW: 05:00: h = 6.22 m+TAW
12:30: h = 0.08 m+TAW
17:50: h = 5.93 m+TAW

Date / Time [MET] :

11-Mar-2008

09:17 - 09:22

Time after HW [HH:MM]

4:20

Data Processed by: IMDC

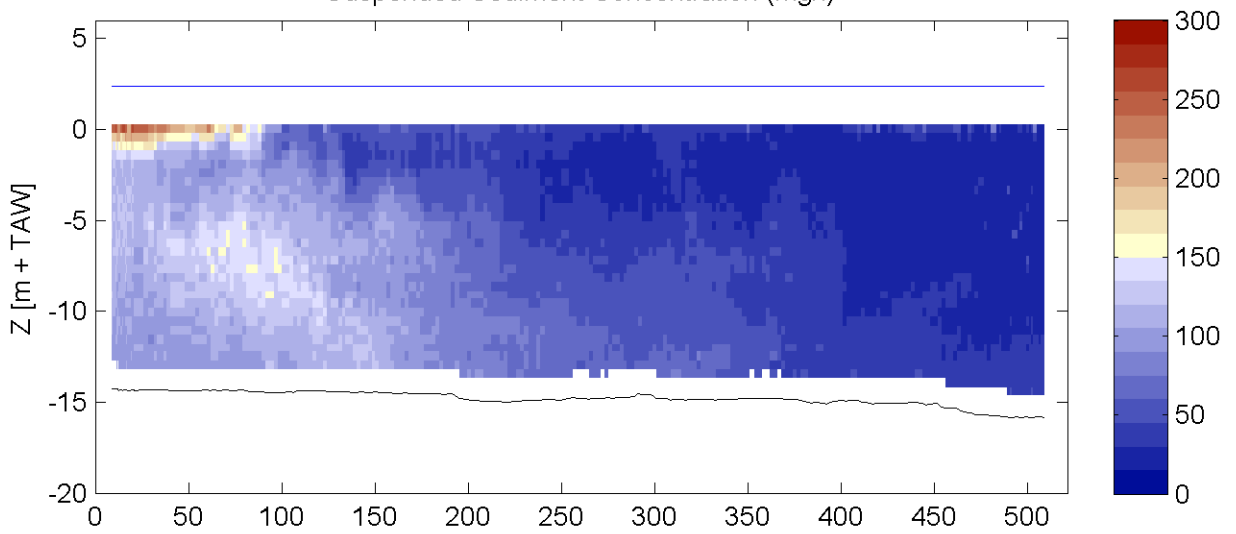
In association with : WL | delft hydraulics, GEMS International

I/RA/11283/07.090/MSA

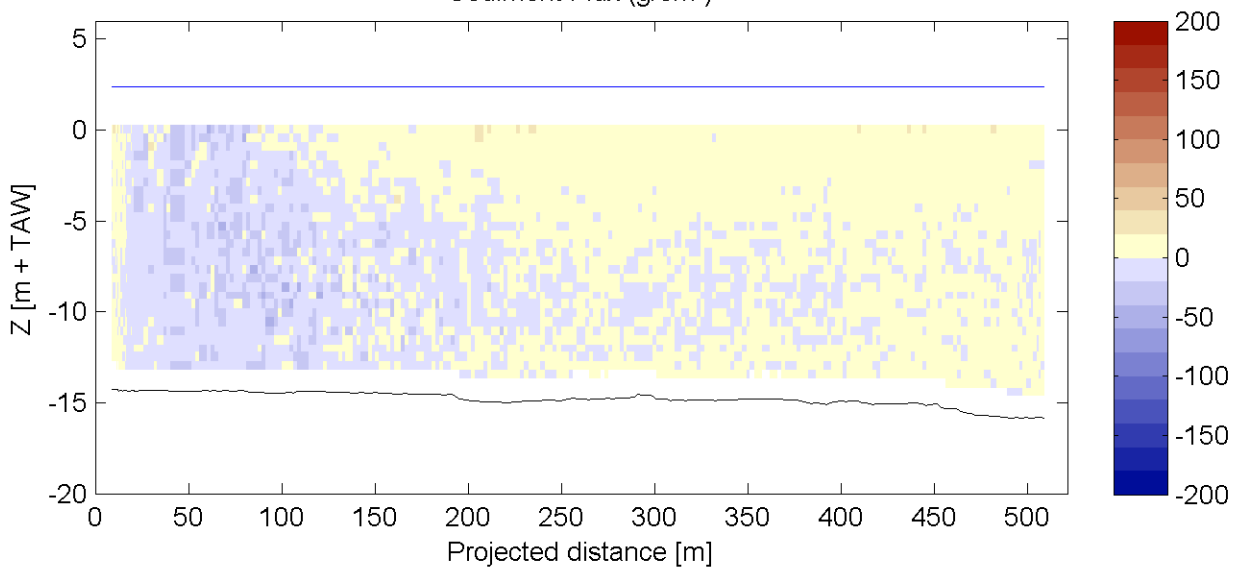
# Through Tide Sediview Measurement Spring tide 11/03/2008

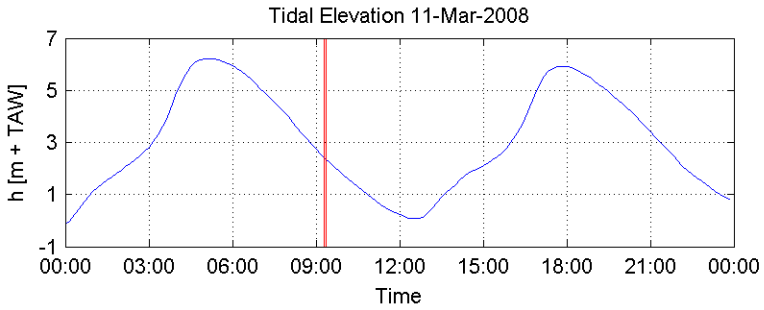
| | |
|---|---|
| 11283 - Aanslibbing Deurganckdok | Equipment(s): ADCP |
| Sourcefile: 3021DGDs_sub.csv | Location: Transect DGD |

Suspended Sediment Concentration (mg/l)




Sediment Flux (g/sm²)




HW/LW:
05:00: h = 6.22 m+TAW
12:30: h = 0.08 m+TAW
17:50: h = 5.93 m+TAW

Date / Time [MET] :

11-Mar-2008

09:17 - 09:22

Time after HW [HH:MM]

4:20

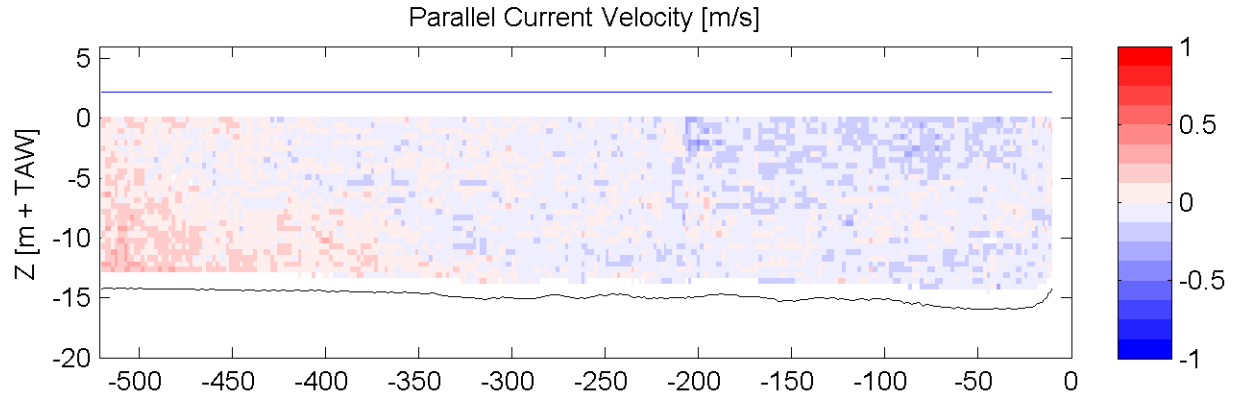
Data Processed by: IMDC

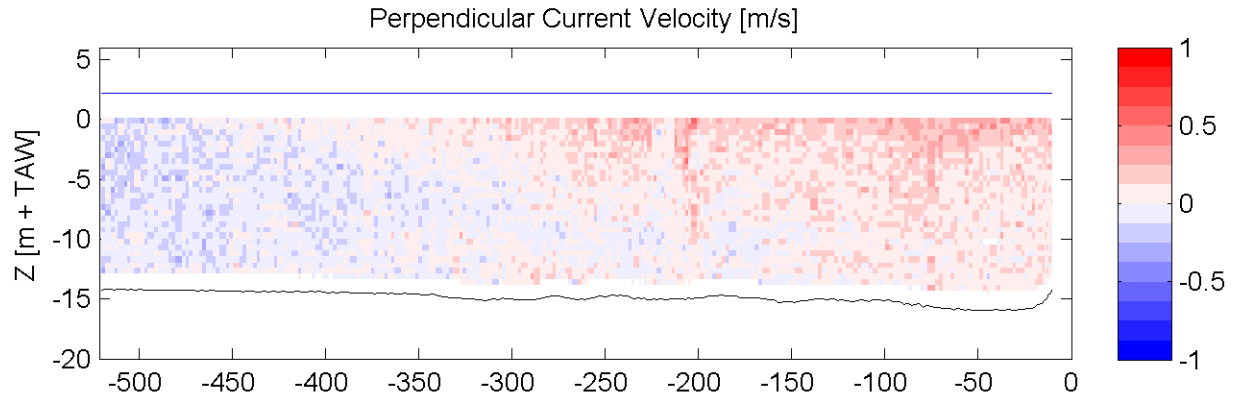
In association with : WL | delft hydraulics, GEMS International

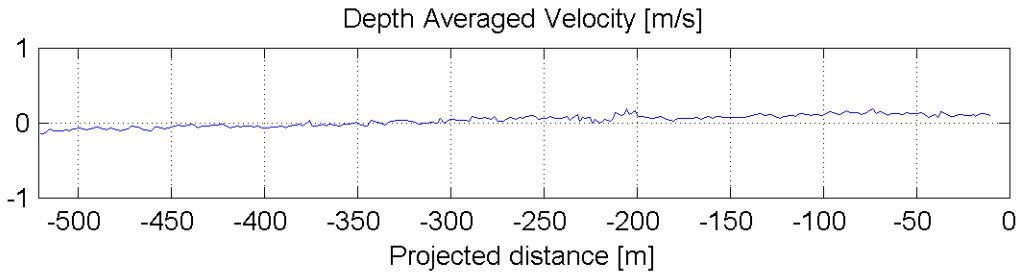
I/RA/11283/07.090/MSA

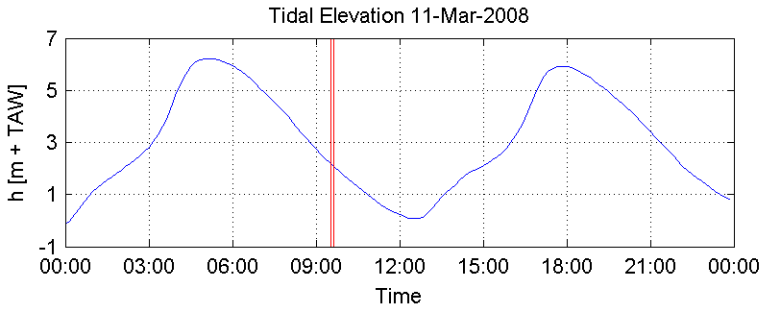
# Through Tide Sediview Measurement Spring tide 11/03/2008

| | |
|---|---|
| 11283 - Aanslibbing Deurganckdok | Equipment(s): ADCP |
| Sourcefile: 3023DGDt_sub.csv | Location: Transect DGD |




HW/LW: 05:00: h = 6.22 m+TAW
12:30: h = 0.08 m+TAW
17:50: h = 5.93 m+TAW

Date / Time [MET] :

11-Mar-2008

09:33 - 09:37

Time after HW [HH:MM]

4:35

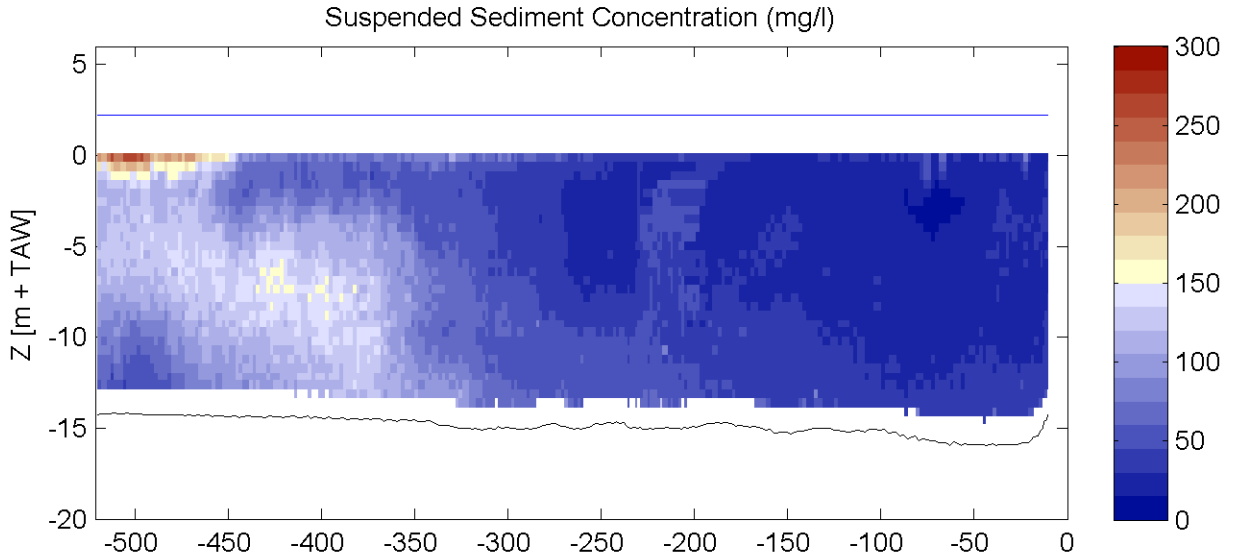
Data Processed by: IMDC

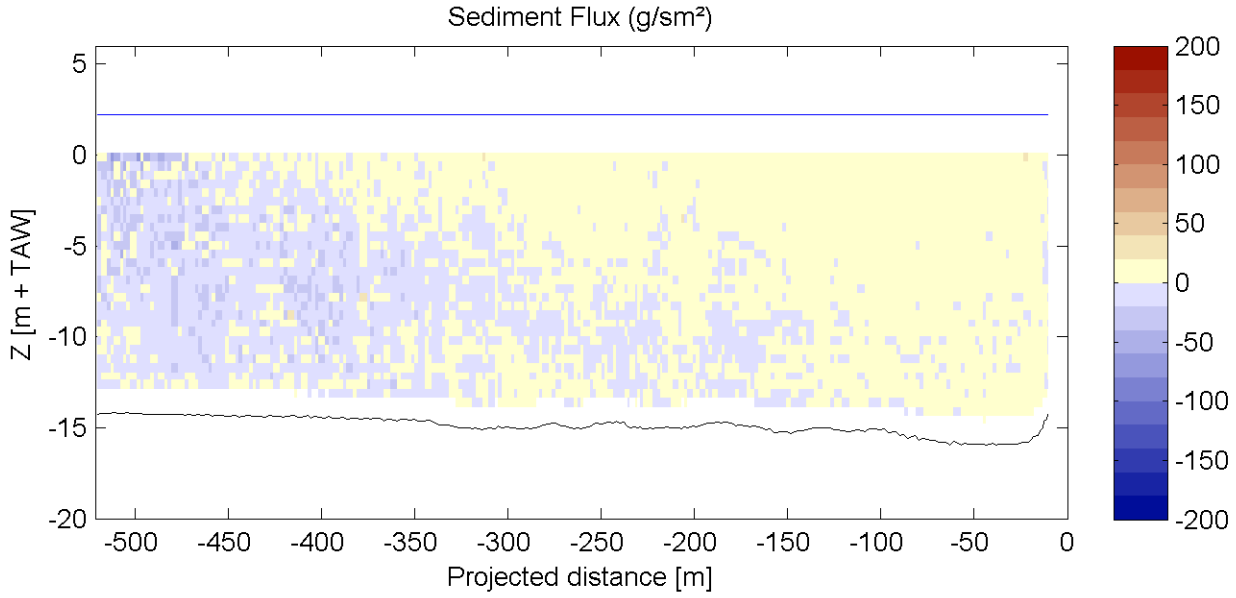
In association with : w.l | delft hydraulics, GEMS International

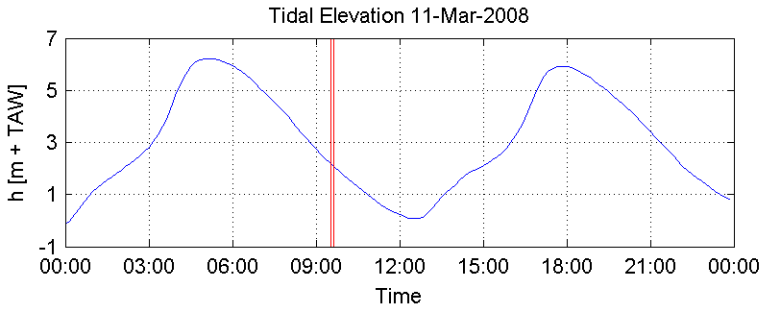
I/RA/11283/07.090/MSA

# Through Tide Sediview Measurement Spring tide 11/03/2008

| | |
|---|---|
| 11283 - Aanslibbing Deurganckdok | Equipment(s): ADCP |
| Sourcefile: 3023DGDt_sub.csv | Location: Transect DGD |




HW/LW:
05:00: h = 6.22 m+TAW
12:30: h = 0.08 m+TAW
17:50: h = 5.93 m+TAW

Date / Time [MET] :
11-Mar-2008
09:33 - 09:37

Time after HW [HH:MM]
4:35

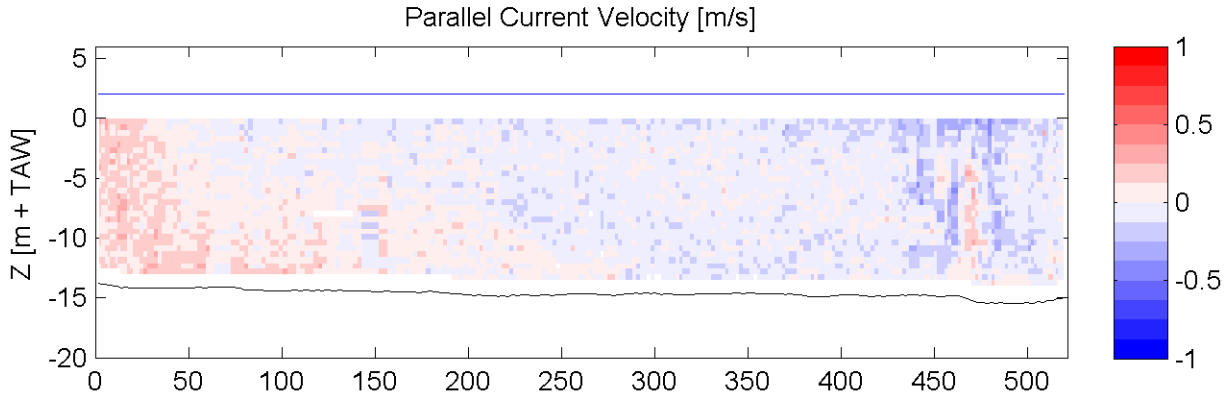
Data Processed by: IMDC

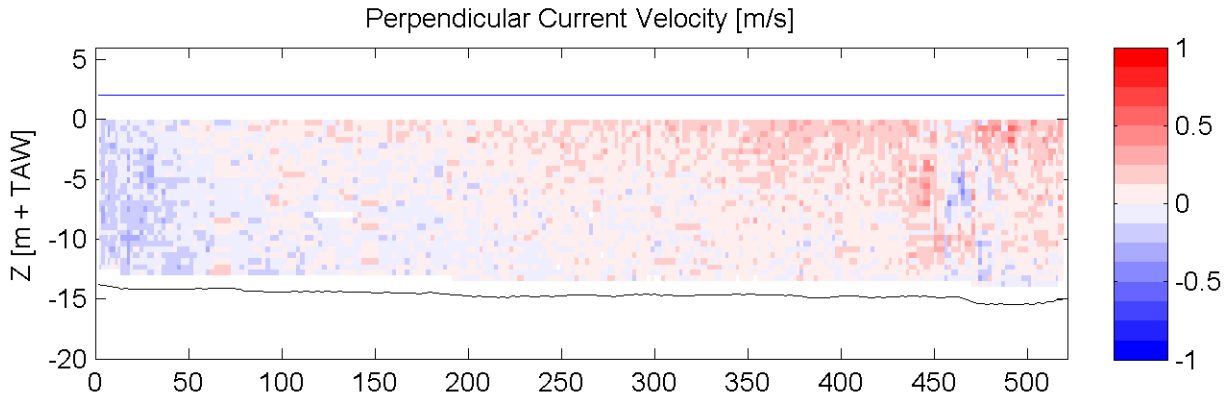
In association with : WL | delft hydraulics, GEMS International

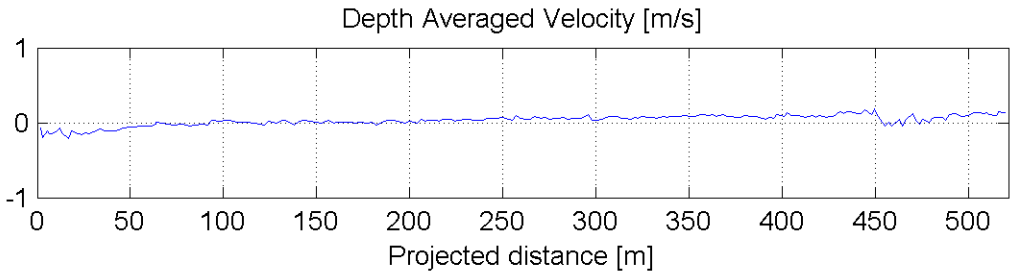
I/RA/11283/07.090/MSA

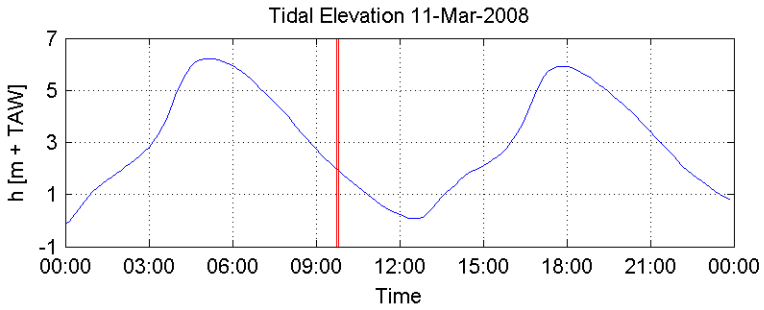
# Through Tide Sediview Measurement Spring tide 11/03/2008

| | |
|---|---|
| 11283 - Aanslibbing Deurganckdok | Equipment(s): ADCP |
| Sourcefile: 3025DGDs_sub.csv | Location: Transect DGD |




HW/LW:
05:00: h = 6.22 m+TAW
12:30: h = 0.08 m+TAW
17:50: h = 5.93 m+TAW

Date / Time [MET] :

11-Mar-2008

09:44 - 09:48

Time after HW [HH:MM]

4:46

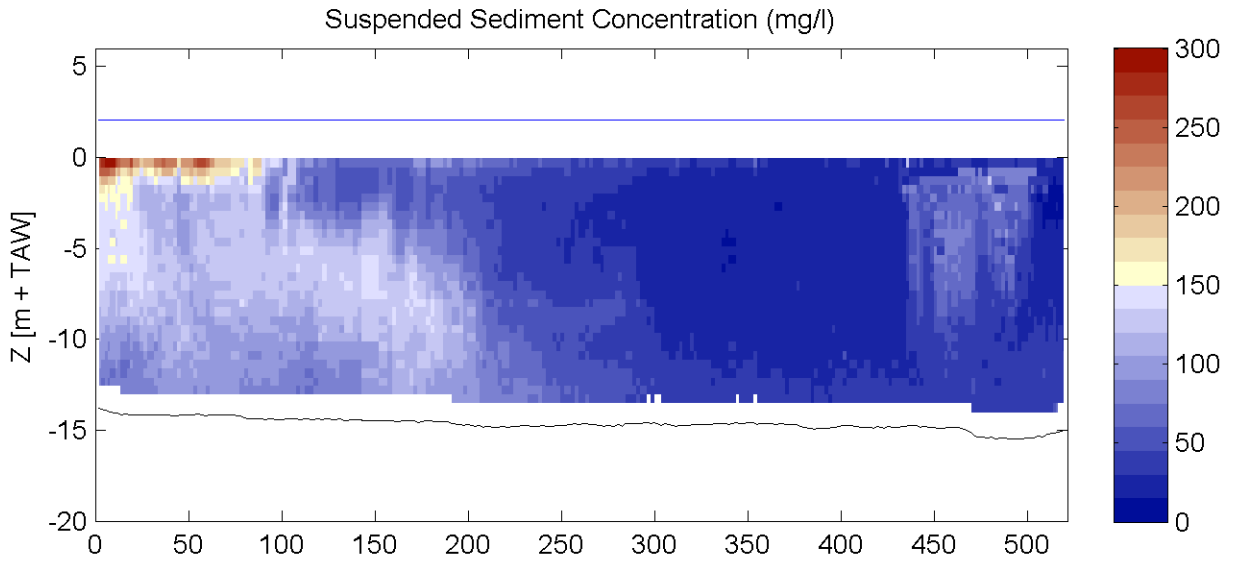
Data Processed by: IMDC

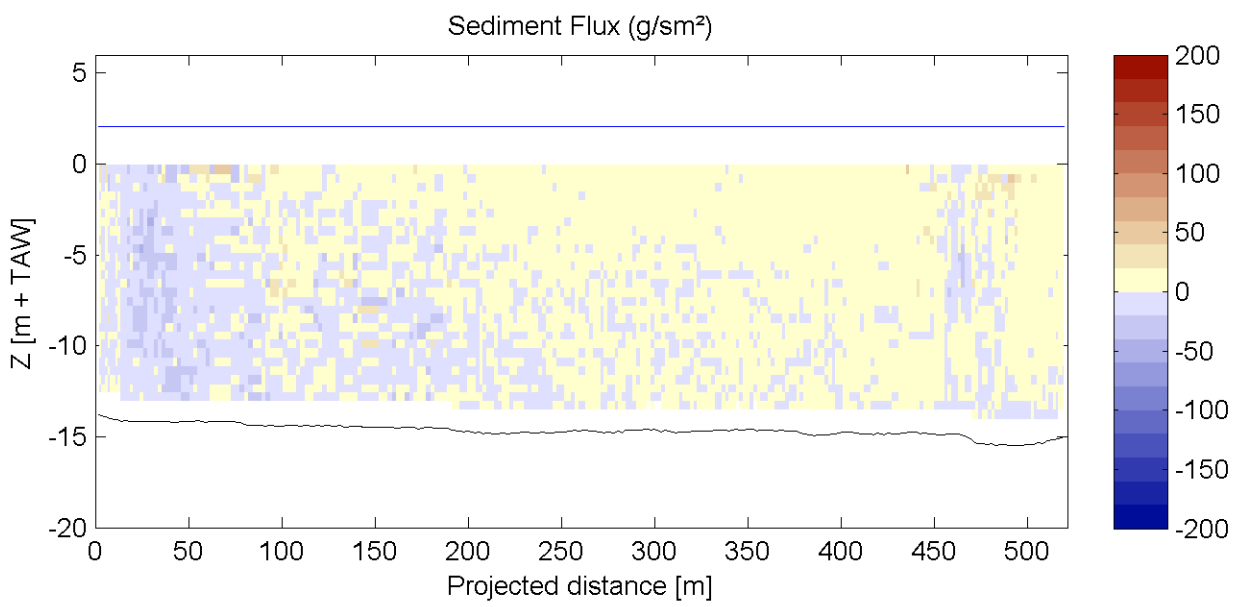
In association with : WL | delft hydraulics, GEMS International

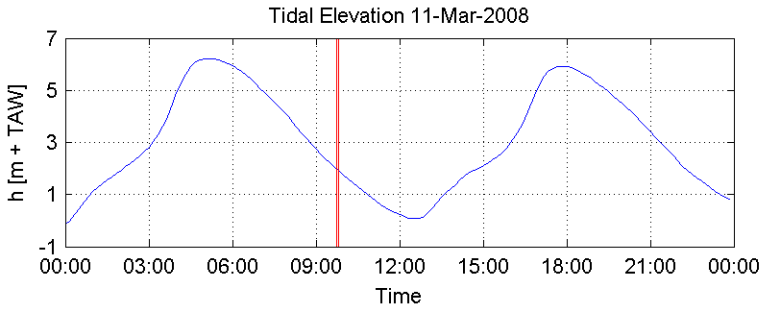
I/RA/11283/07.090/MSA

# Through Tide Sediview Measurement Spring tide 11/03/2008

| | |
|---|---|
| 11283 - Aanslibbing Deurganckdok | Equipment(s): ADCP |
| Sourcefile: 3025DGDs_sub.csv | Location: Transect DGD |




HW/LW:
05:00: h = 6.22 m+TAW
12:30: h = 0.08 m+TAW
17:50: h = 5.93 m+TAW

Date / Time [MET] :

11-Mar-2008

09:44 - 09:48

Time after HW [HH:MM]

4:46

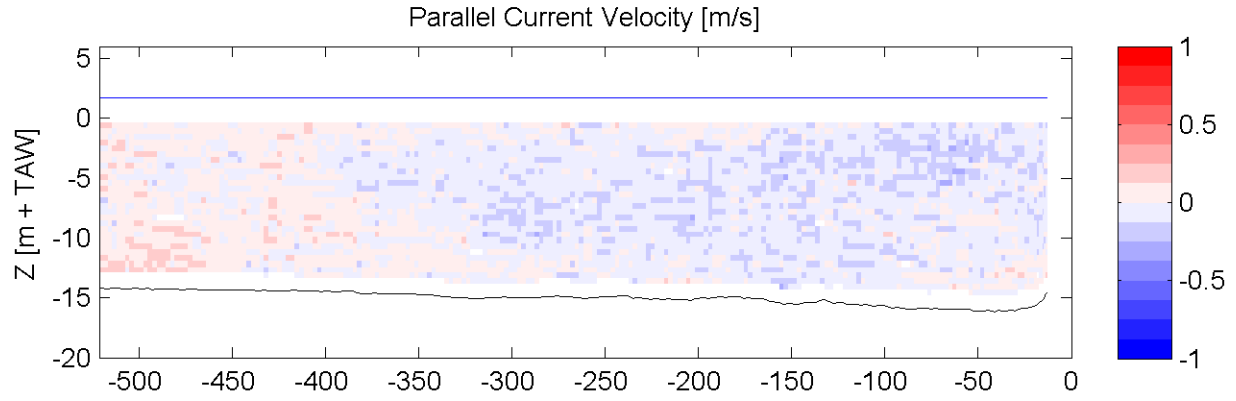
Data Processed by: IMDC

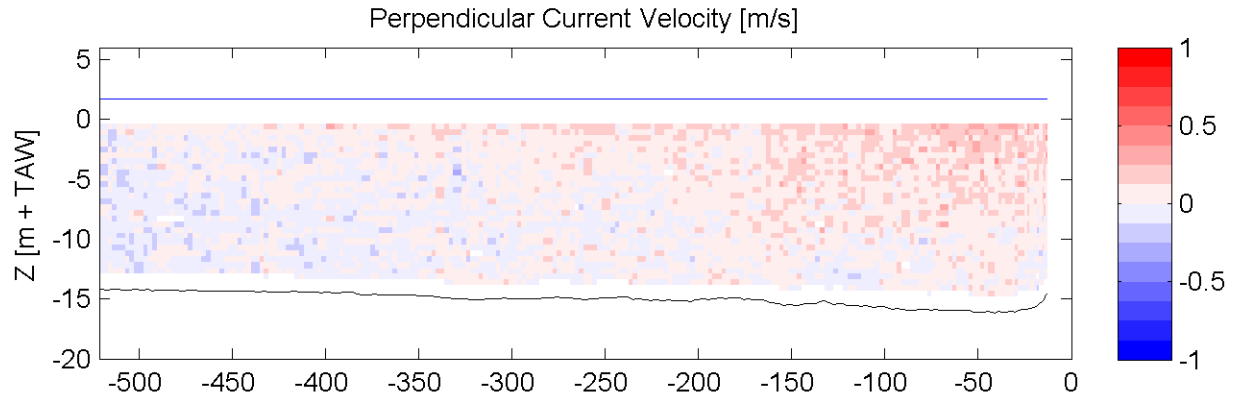
In association with : w.l | delft hydraulics, GEMS International

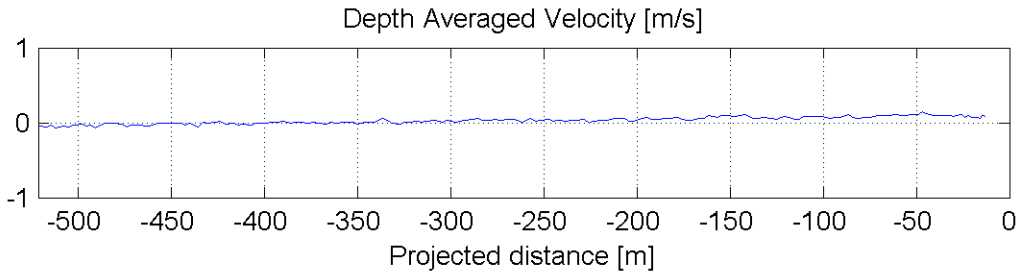
I/RA/11283/07.090/MSA

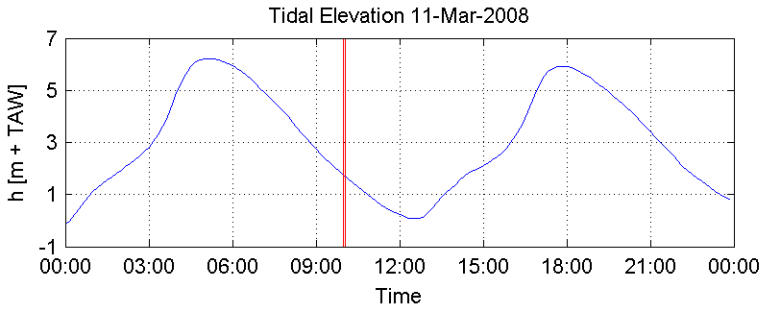
# Through Tide Sediview Measurement Spring tide 11/03/2008

| | |
|---|---|
| 11283 - Aanslibbing Deurganckdok | Equipment(s): ADCP |
| Sourcefile: 3027DGDt_sub.csv | Location: Transect DGD |




HW/LW:
05:00: h = 6.22 m+TAW
12:30: h = 0.08 m+TAW
17:50: h = 5.93 m+TAW

Date / Time [MET] :

11-Mar-2008

09:58 - 10:02

Time after HW [HH:MM]

5:00

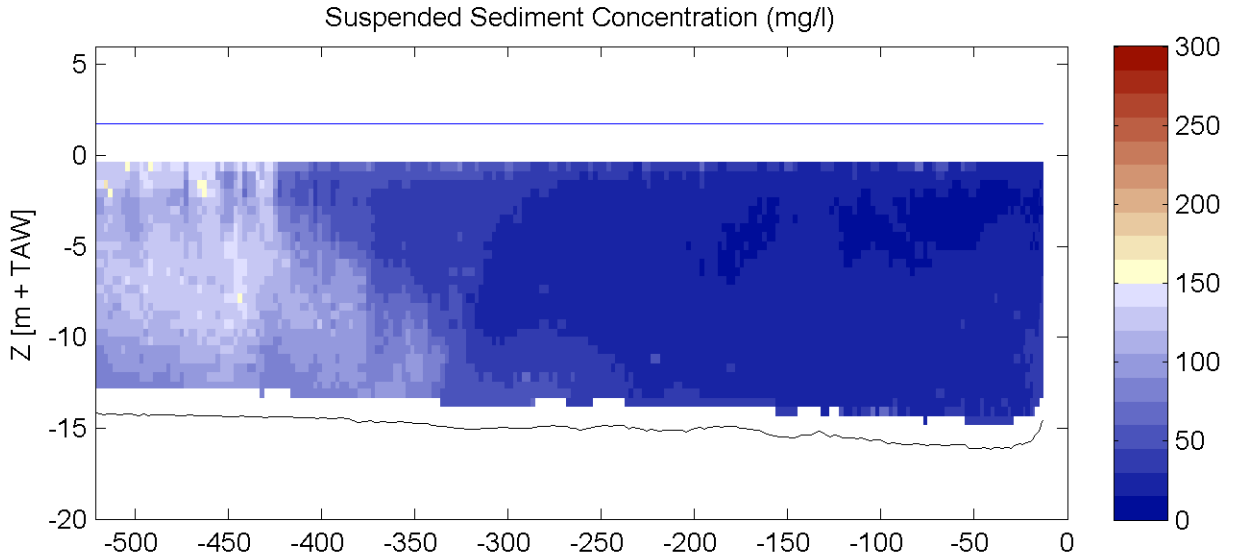
Data Processed by: IMDC

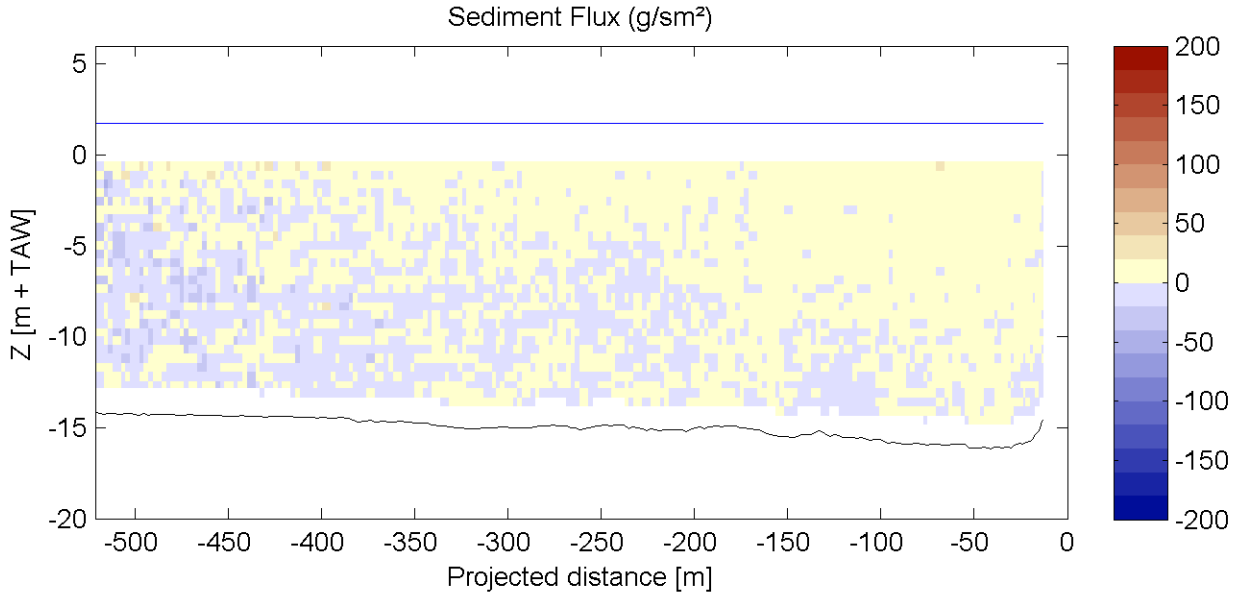
In association with : w.l | delft hydraulics, GEMS International

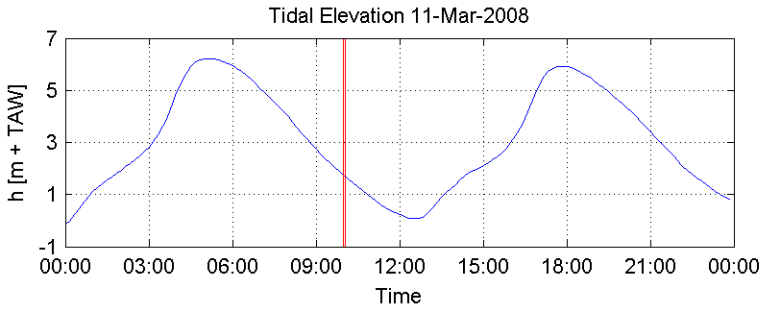
I/RA/11283/07.090/MSA

# Through Tide Sediview Measurement Spring tide 11/03/2008

| | |
|---|---|
| 11283 - Aanslibbing Deurganckdok | Equipment(s): ADCP |
| Sourcefile: 3027DGDt_sub.csv | Location: Transect DGD |




HW/LW:
05:00: h = 6.22 m+TAW
12:30: h = 0.08 m+TAW
17:50: h = 5.93 m+TAW

Date / Time [MET] :

11-Mar-2008

09:58 - 10:02

Time after HW [HH:MM]

5:00

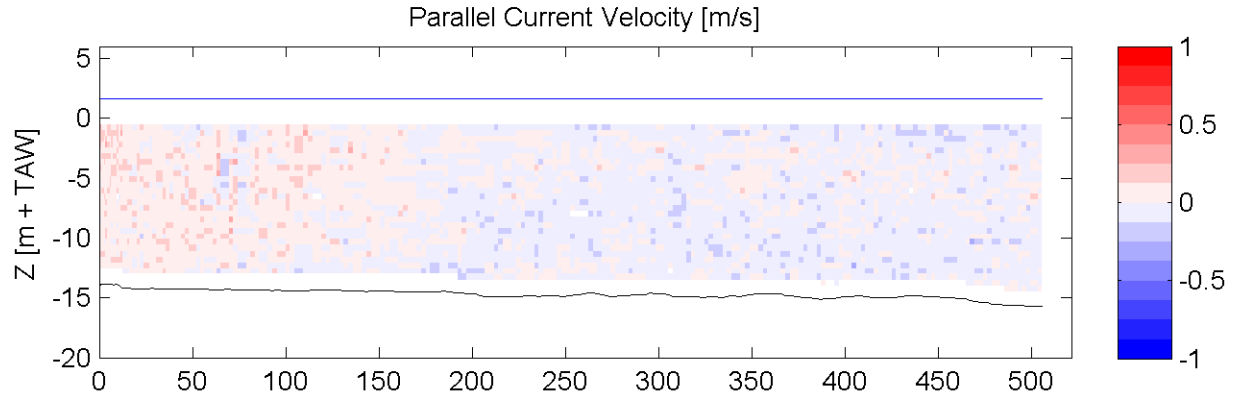
Data Processed by: IMDC

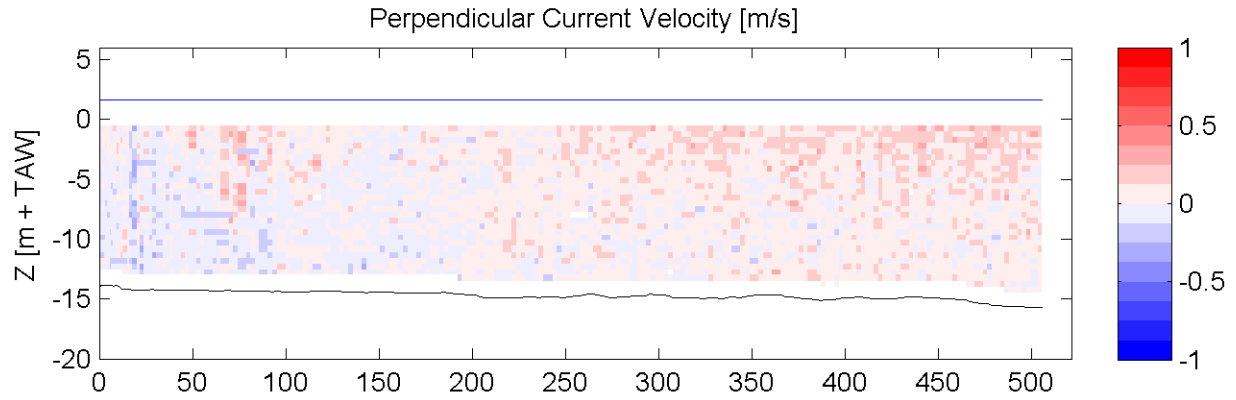
In association with : WL | delft hydraulics, GEMS International

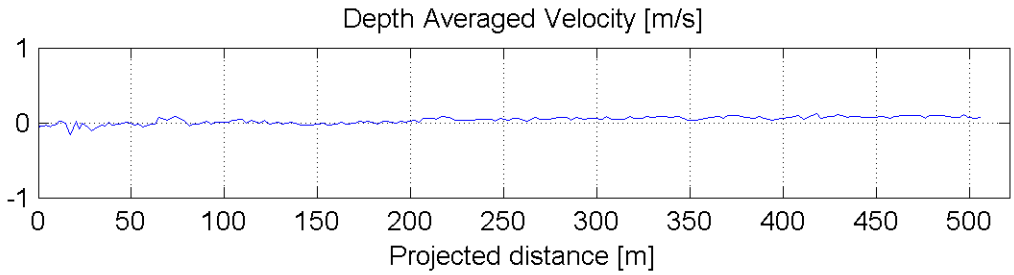
I/RA/11283/07.090/MSA

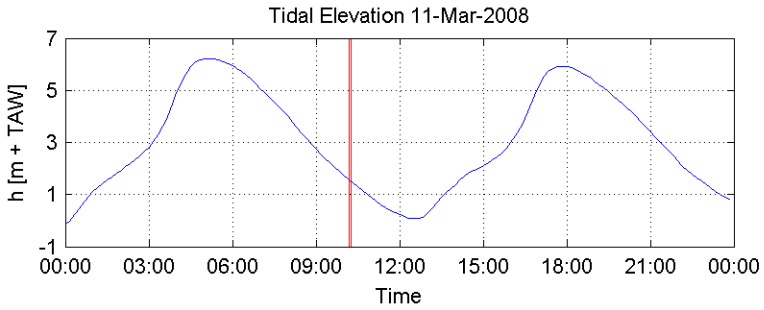
# Through Tide Sediview Measurement Spring tide 11/03/2008

| | |
|---|---|
| 11283 - Aanslibbing Deurganckdok | Equipment(s): ADCP |
| Sourcefile: 3029DGDs_sub.csv | Location: Transect DGD |




HW/LW: 05:00: h = 6.22 m+TAW
12:30: h = 0.08 m+TAW
17:50: h = 5.93 m+TAW

Date / Time [MET] :

11-Mar-2008

10:11 - 10:15

Time after HW [HH:MM]

5:13

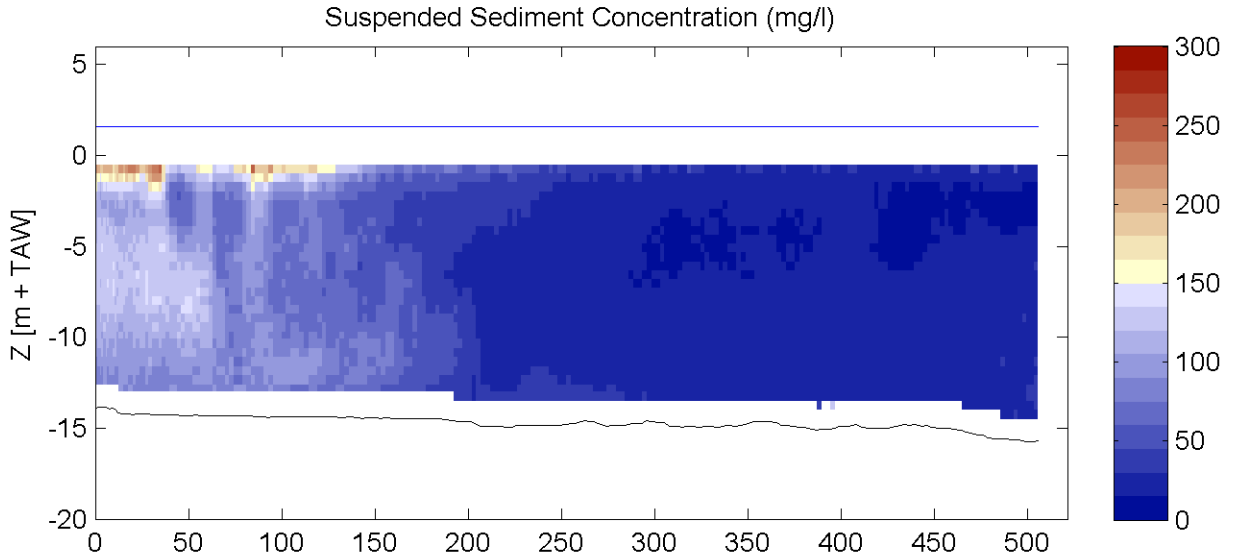
Data Processed by: IMDC

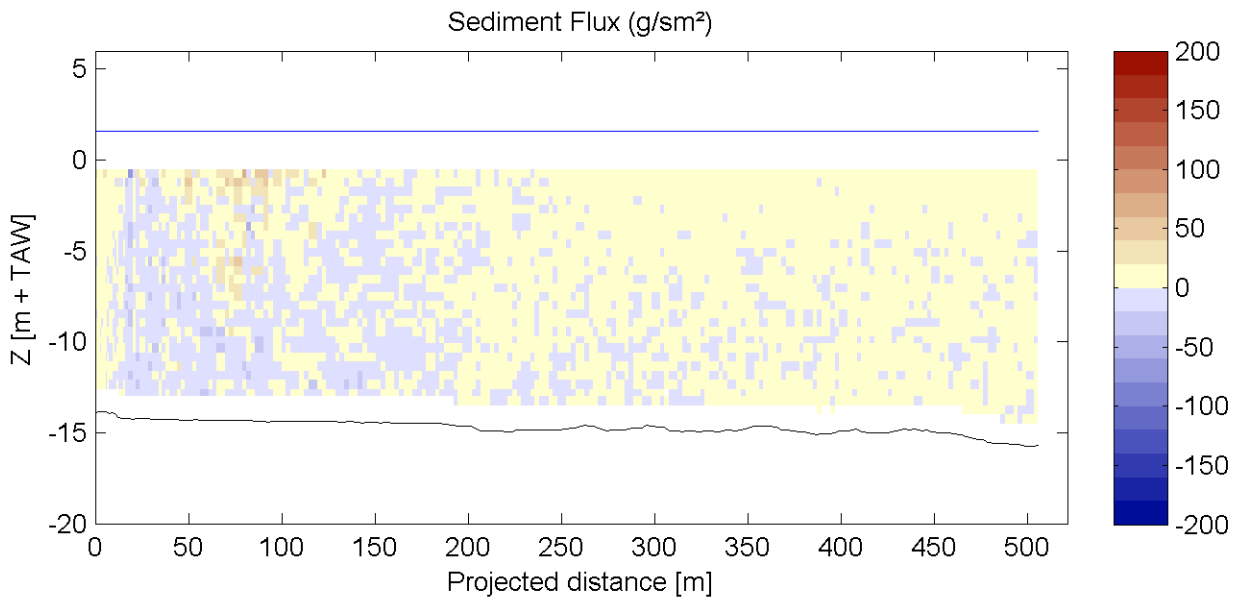
In association with : WL | delft hydraulics, GEMS International

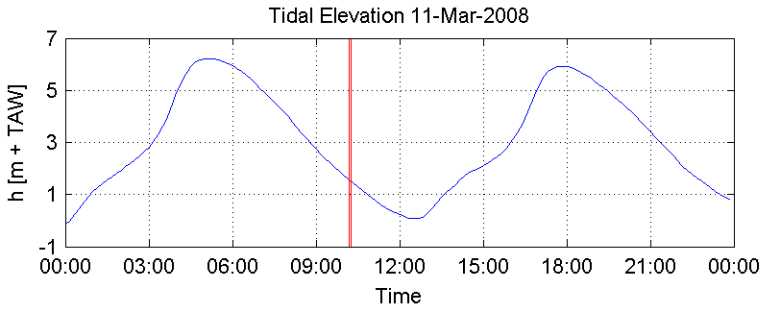
I/RA/11283/07.090/MSA

# Through Tide Sediview Measurement Spring tide 11/03/2008

| | |
|---|---|
| 11283 - Aanslibbing Deurganckdok | Equipment(s): ADCP |
| Sourcefile: 3029DGDs_sub.csv | Location: Transect DGD |




HW/LW:
05:00: h = 6.22 m+TAW
12:30: h = 0.08 m+TAW
17:50: h = 5.93 m+TAW

Date / Time [MET] :

11-Mar-2008

10:11 - 10:15

Time after HW [HH:MM]

5:13

Data Processed by: IMDC

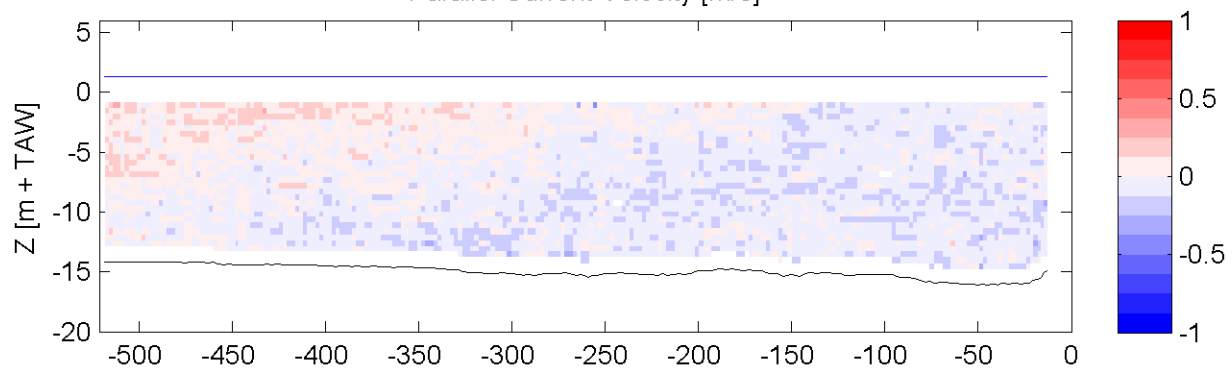
In association with : WL | delft hydraulics, GEMS International

I/RA/11283/07.090/MSA

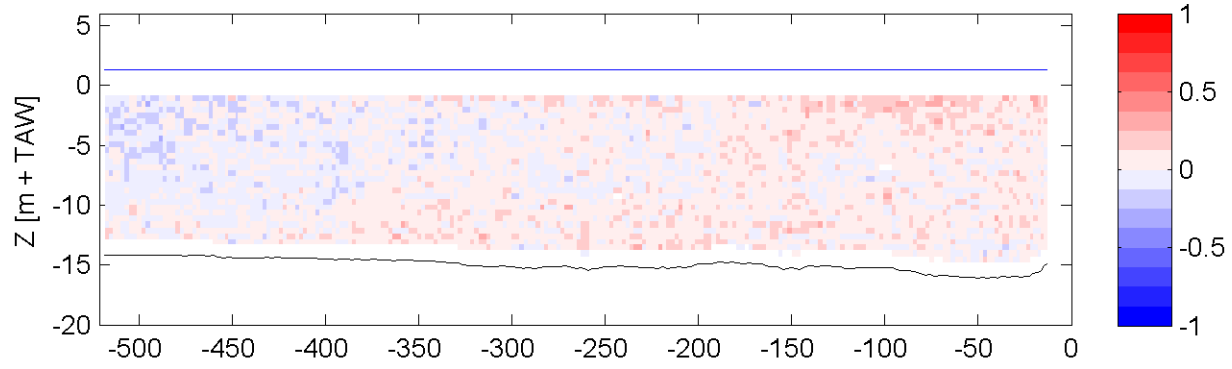
# Through Tide Sediview Measurement Spring tide 11/03/2008

| | |
|---|---|
| 11283 - Aanslibbing Deurganckdok | Equipment(s): ADCP |
| Sourcefile: 3031DGDt_sub.csv | Location: Transect DGD |

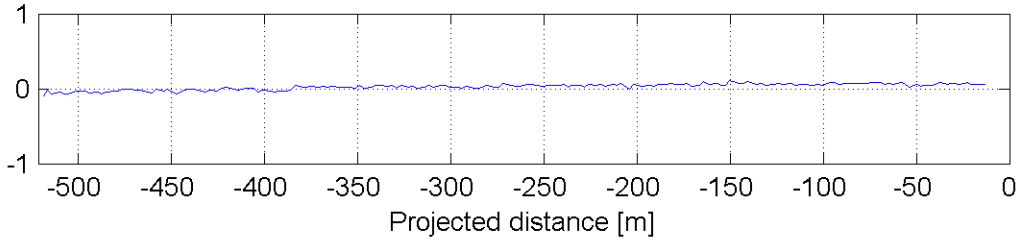
Parallel Current Velocity [m/s]



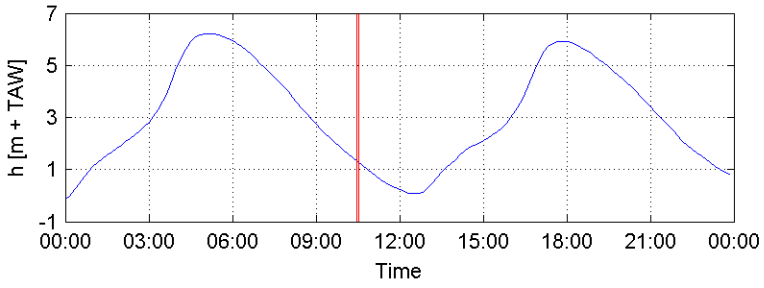

Perpendicular Current Velocity [m/s]




Depth Averaged Velocity [m/s]




Tidal Elevation 11-Mar-2008




HW/LW:
05:00: h = 6.22 m+TAW
12:30: h = 0.08 m+TAW
17:50: h = 5.93 m+TAW

Date / Time [MET] :
11-Mar-2008
10:28 - 10:32

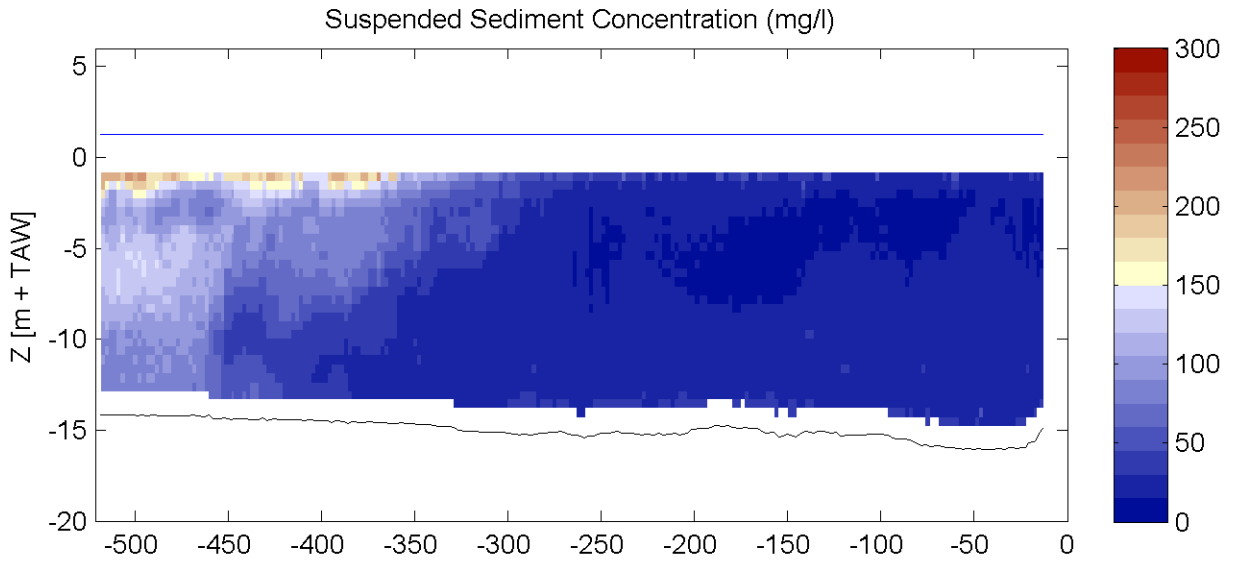
Time after HW [HH:MM]
5:30

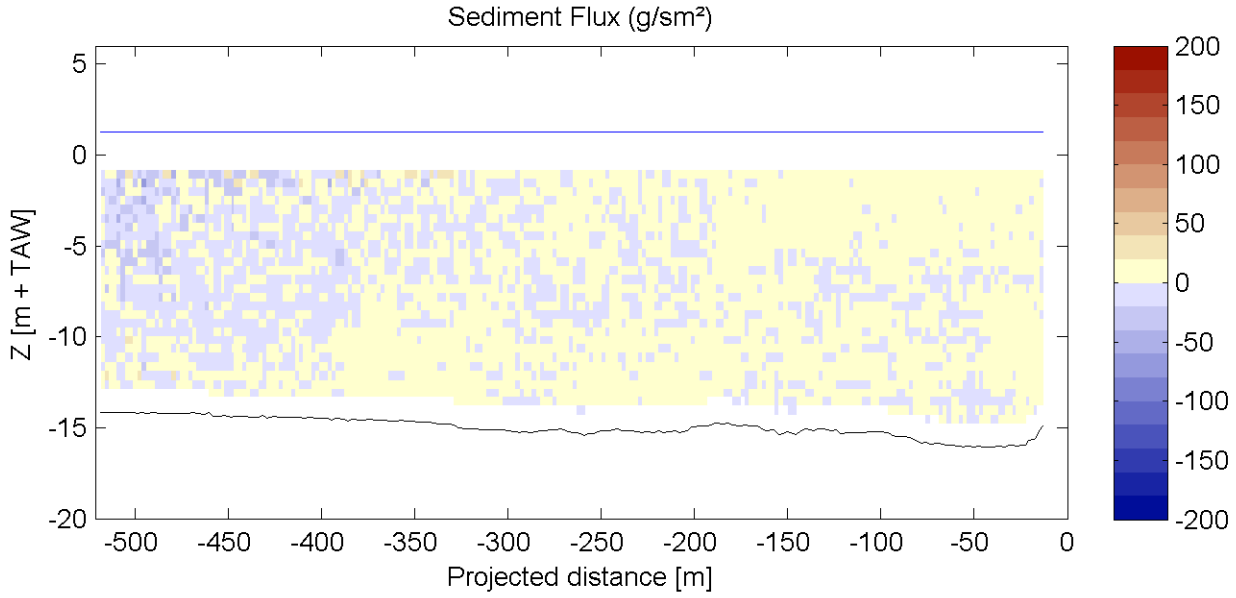
Data Processed by: IMDC
In association with : WL | delft hydraulics, GEMS International

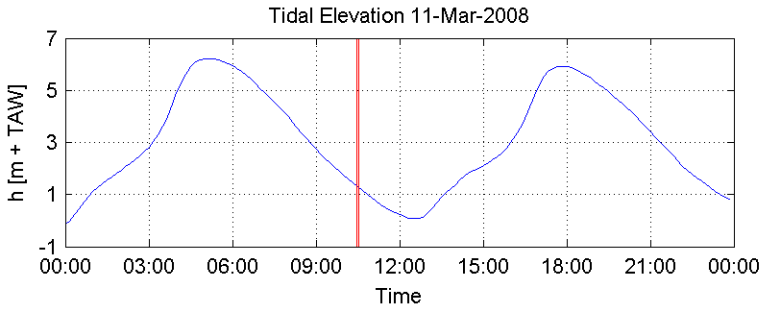
I/RA/11283/07.090/MSA

# Through Tide Sediview Measurement Spring tide 11/03/2008

| | |
|---|---|
| 11283 - Aanslibbing Deurganckdok | Equipment(s): ADCP |
| Sourcefile: 3031DGDt_sub.csv | Location: Transect DGD |




HW/LW:
05:00: h = 6.22 m+TAW
12:30: h = 0.08 m+TAW
17:50: h = 5.93 m+TAW

Date / Time [MET] :

11-Mar-2008

10:28 - 10:32

Time after HW [HH:MM]

5:30

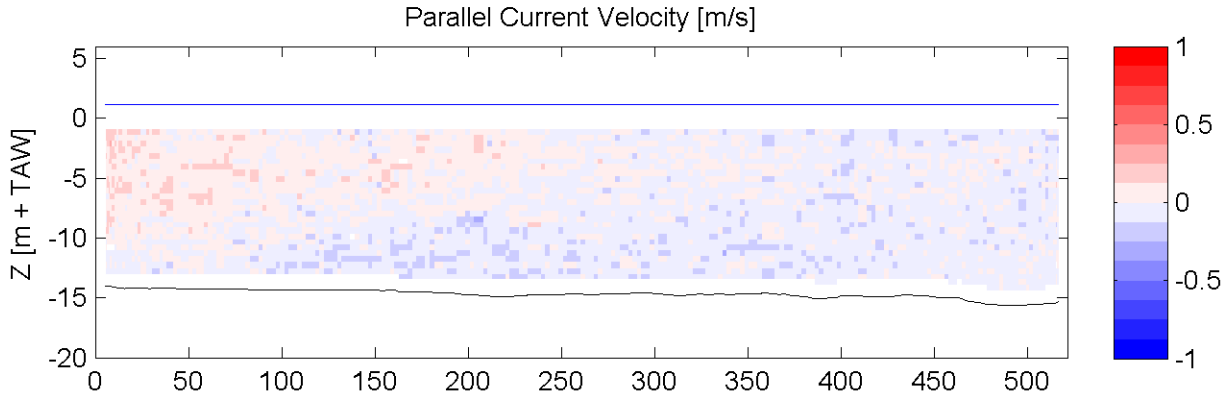
Data Processed by: IMDC

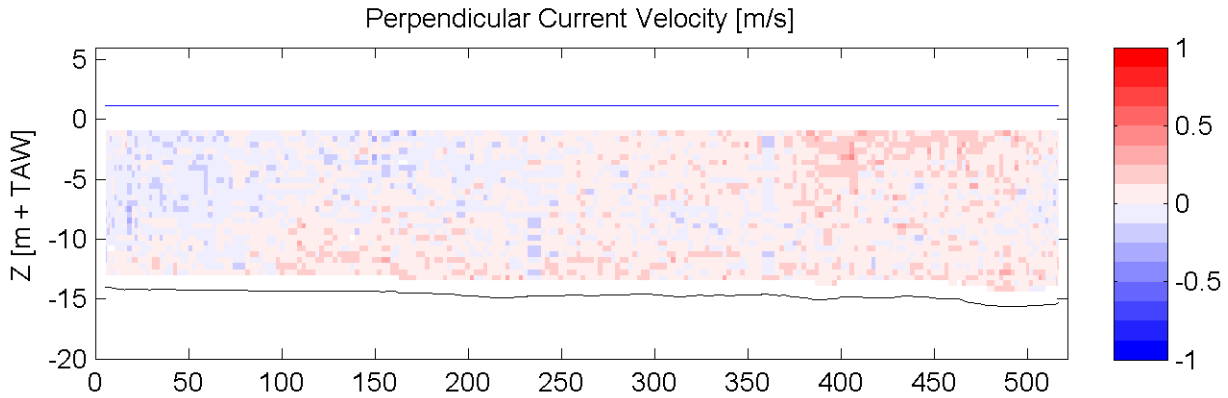
In association with : WL | delft hydraulics, GEMS International

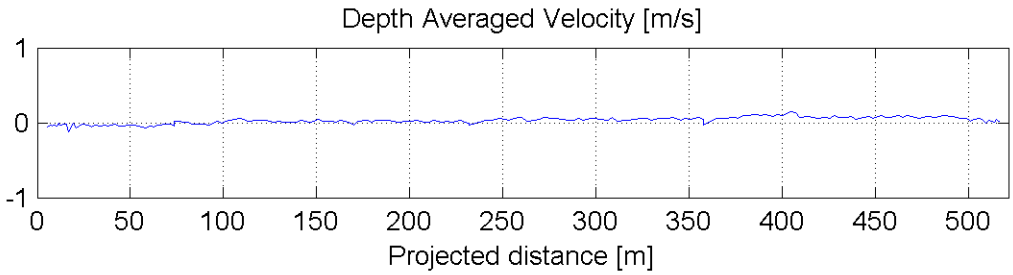
I/RA/11283/07.090/MSA

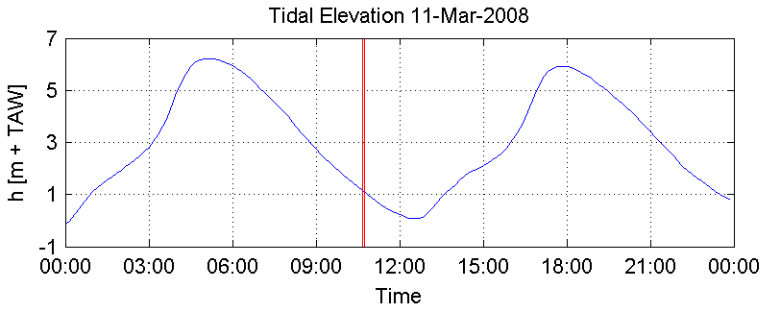
# Through Tide Sediview Measurement Spring tide 11/03/2008

| | |
|---|---|
| 11283 - Aanslibbing Deurganckdok | Equipment(s): ADCP |
| Sourcefile: 3033DGDs_sub.csv | Location: Transect DGD |




HW/LW: 05:00: h = 6.22 m+TAW
12:30: h = 0.08 m+TAW
17:50: h = 5.93 m+TAW

Date / Time [MET] :

11-Mar-2008

10:41 - 10:45

Time after HW [HH:MM]

5:43

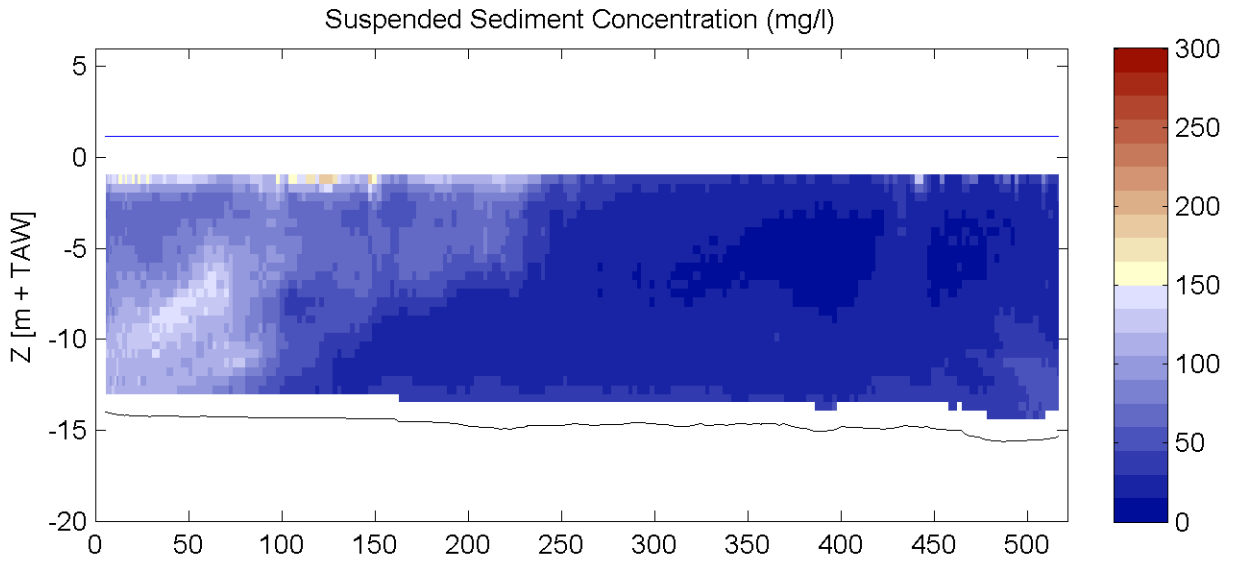
Data Processed by: IMDC

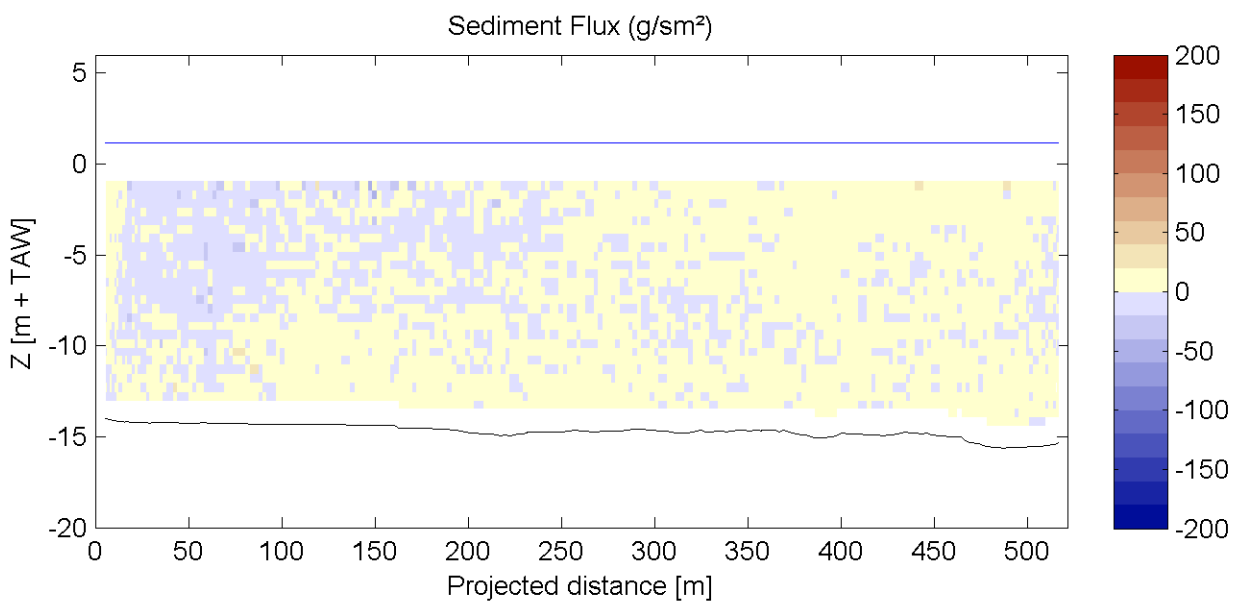
In association with : w.l | delft hydraulics, GEMS International

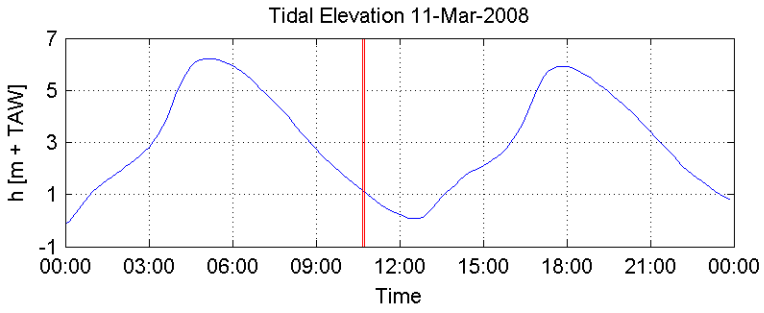
I/RA/11283/07.090/MSA

# Through Tide Sediview Measurement Spring tide 11/03/2008

| | |
|---|---|
| 11283 - Aanslibbing Deurganckdok | Equipment(s): ADCP |
| Sourcefile: 3033DGDs_sub.csv | Location: Transect DGD |




HW/LW:
05:00: h = 6.22 m+TAW
12:30: h = 0.08 m+TAW
17:50: h = 5.93 m+TAW

Date / Time [MET] :

11-Mar-2008

10:41 - 10:45

Time after HW [HH:MM]

5:43

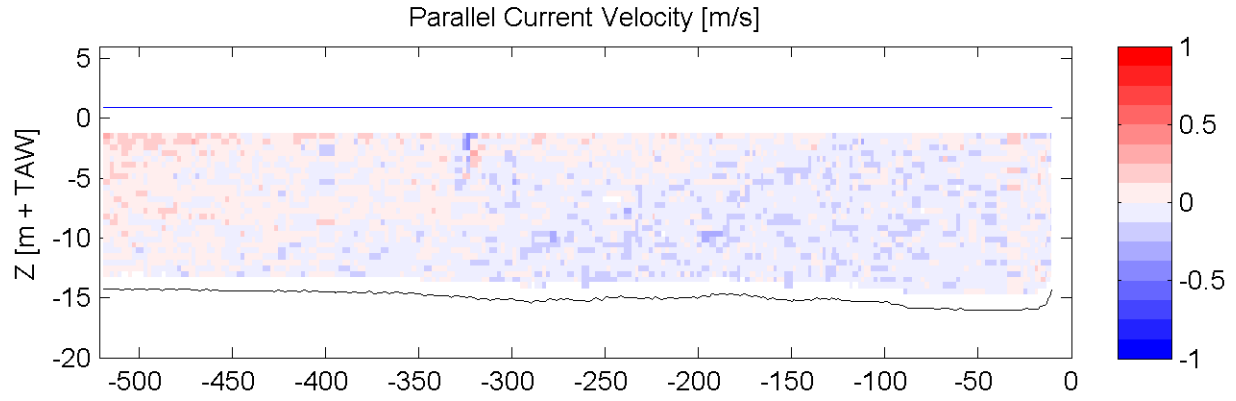
Data Processed by: IMDC

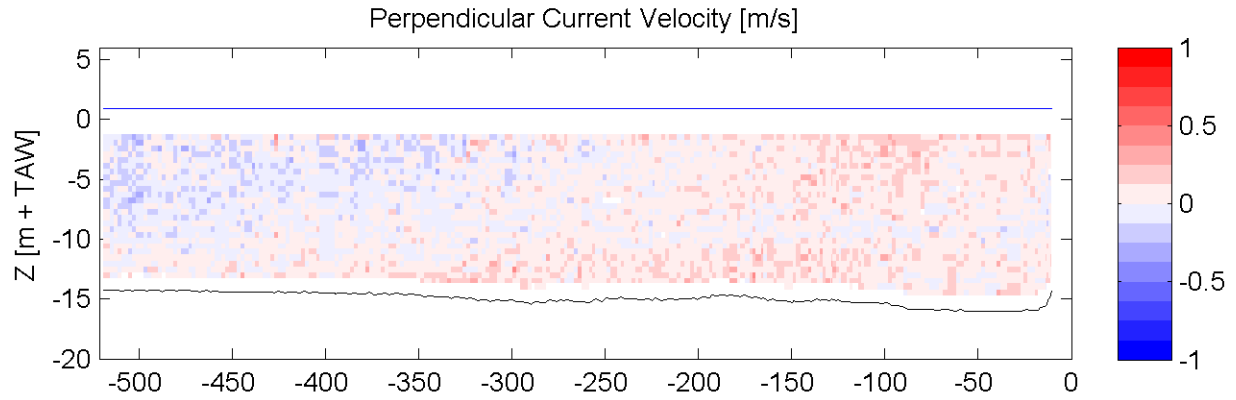
In association with : WL | delft hydraulics, GEMS International

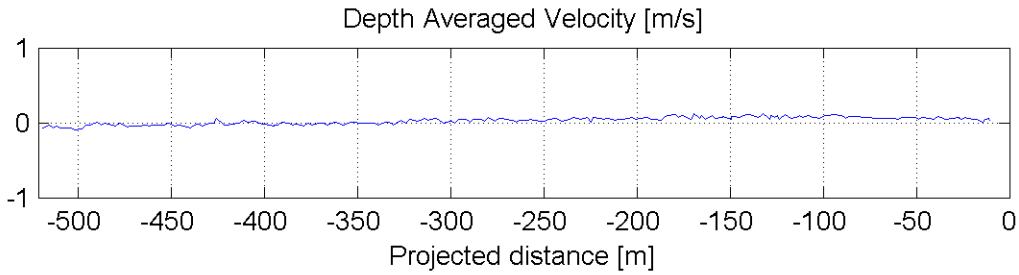
I/RA/11283/07.090/MSA

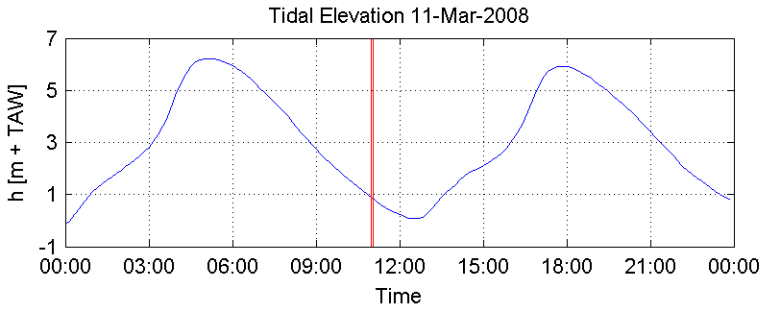
# Through Tide Sediview Measurement Spring tide 11/03/2008

| | |
|---|---|
| 11283 - Aanslibbing Deurganckdok | Equipment(s): ADCP |
| Sourcefile: 3035DGDt_sub.csv | Location: Transect DGD |




HW/LW:
05:00: h = 6.22 m+TAW
12:30: h = 0.08 m+TAW
17:50: h = 5.93 m+TAW

Date / Time [MET] :
11-Mar-2008
10:58 - 11:02

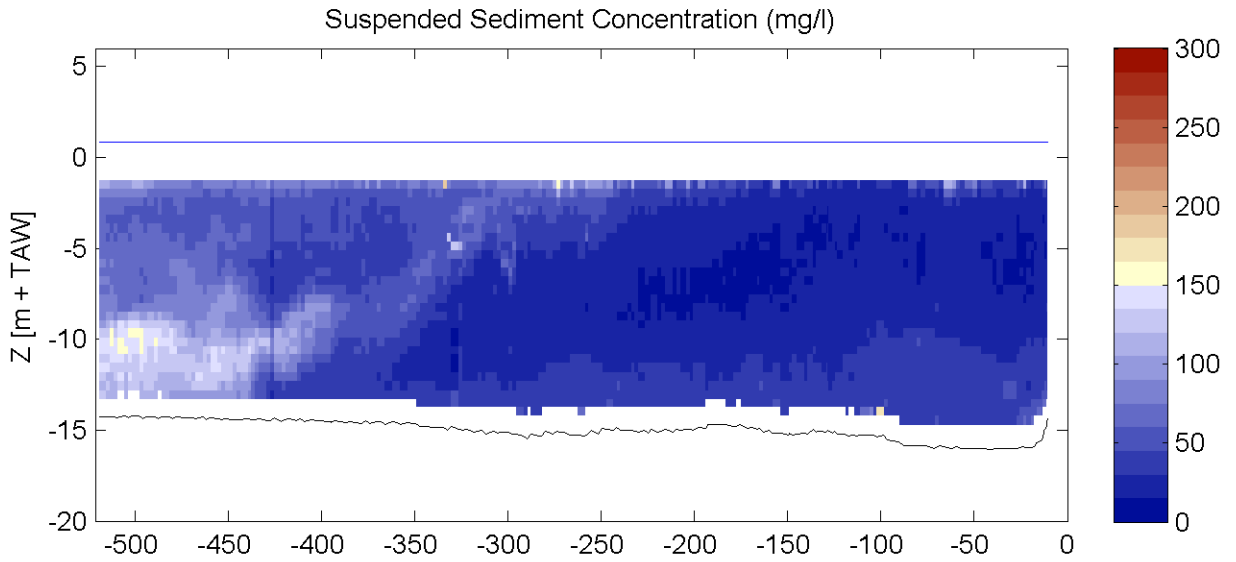
Time after HW [HH:MM]
6:00

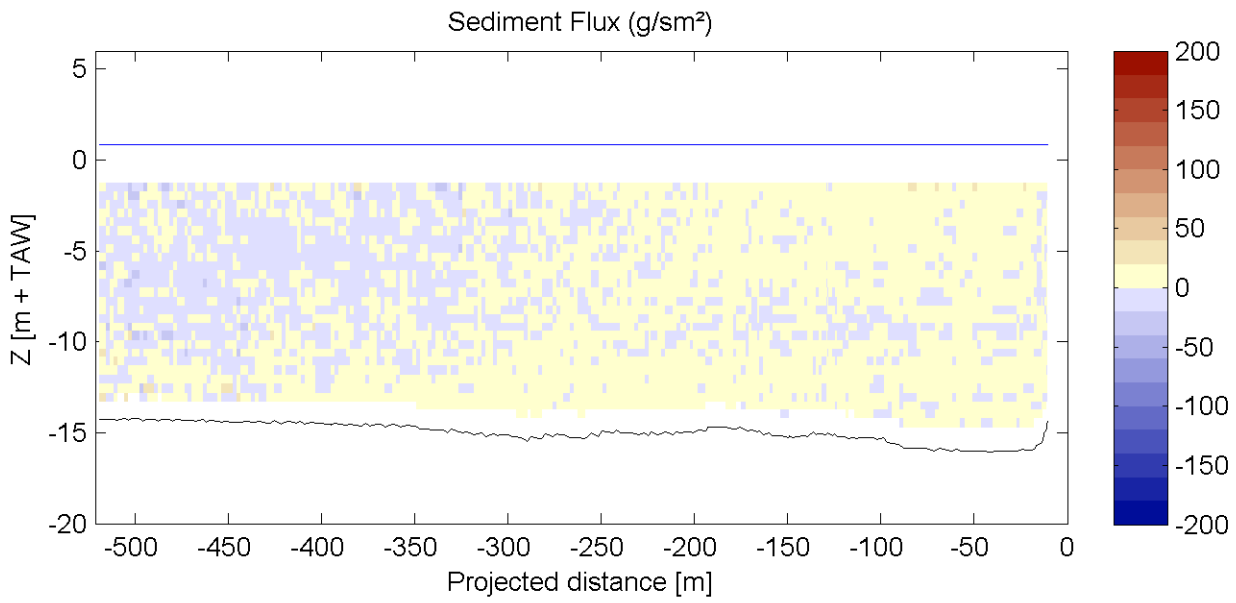
Data Processed by: IMDC
In association with : WL | delft hydraulics, GEMS International

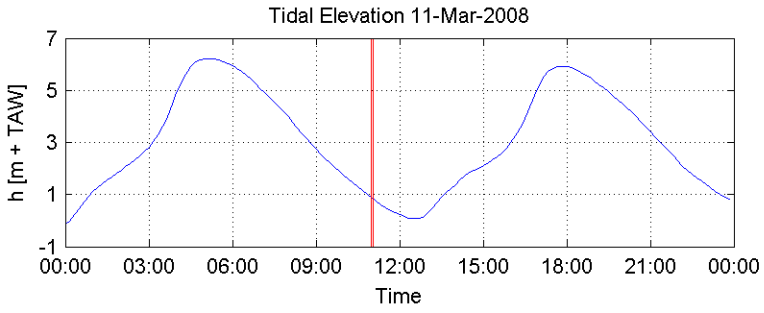
I/RA/11283/07.090/MSA

# Through Tide Sediview Measurement Spring tide 11/03/2008

| | |
|---|---|
| 11283 - Aanslibbing Deurganckdok | Equipment(s): ADCP |
| Sourcefile: 3035DGDt_sub.csv | Location: Transect DGD |




HW/LW:
05:00: h = 6.22 m+TAW
12:30: h = 0.08 m+TAW
17:50: h = 5.93 m+TAW

Date / Time [MET] :

11-Mar-2008

10:58 - 11:02

Time after HW [HH:MM]

6:00

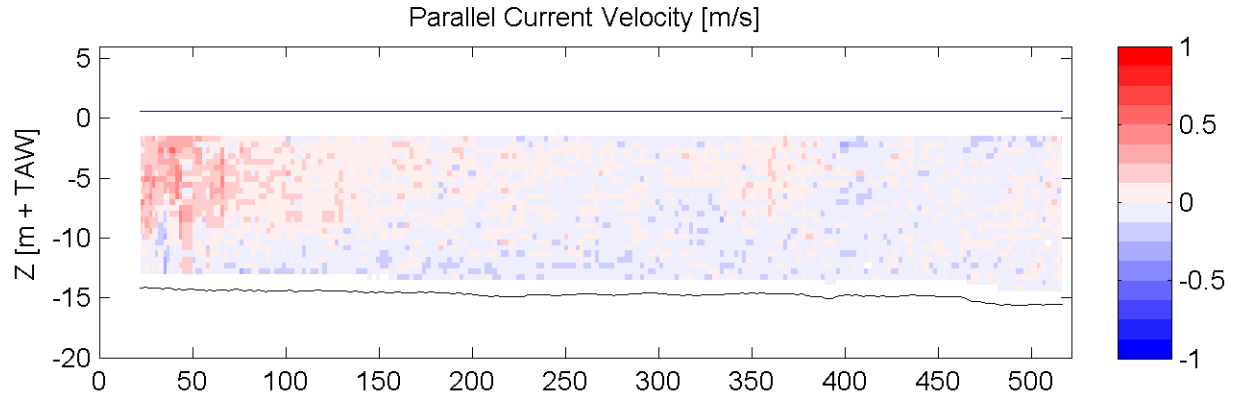
Data Processed by:

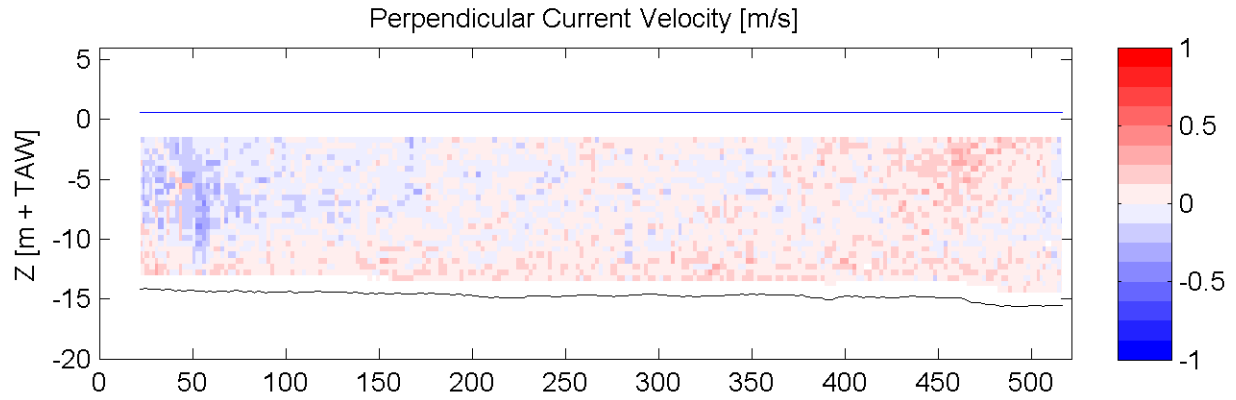
In association with :

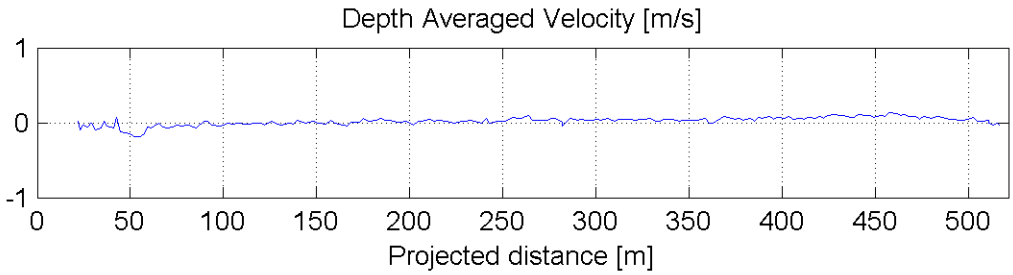
I/RA/11283/07.090/MSA

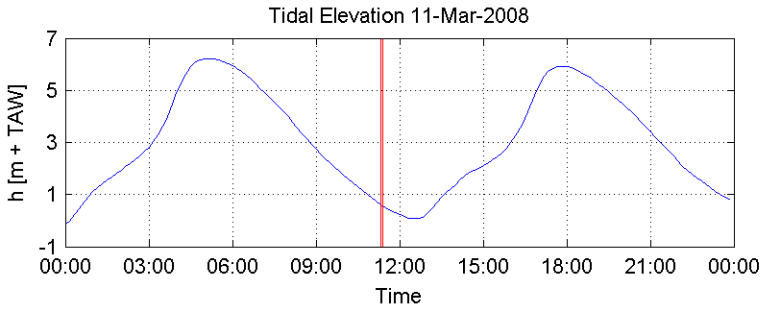
# Through Tide Sediview Measurement Spring tide 11/03/2008

| | |
|---|---|
| 11283 - Aanslibbing Deurganckdok | Equipment(s): ADCP |
| Sourcefile: 3037DGDs_sub.csv | Location: Transect DGD |




HW/LW: 05:00: h = 6.22 m+TAW
12:30: h = 0.08 m+TAW
17:50: h = 5.93 m+TAW

Date / Time [MET] :

11-Mar-2008

11:18 - 11:22

Time after HW [HH:MM]

6:20

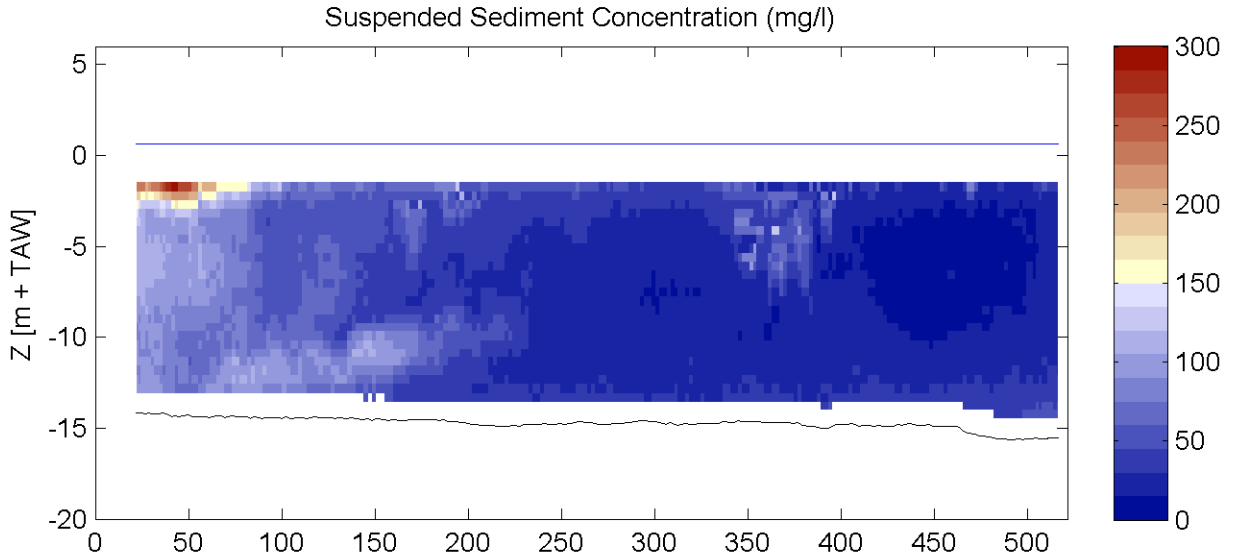
Data Processed by: IMDC

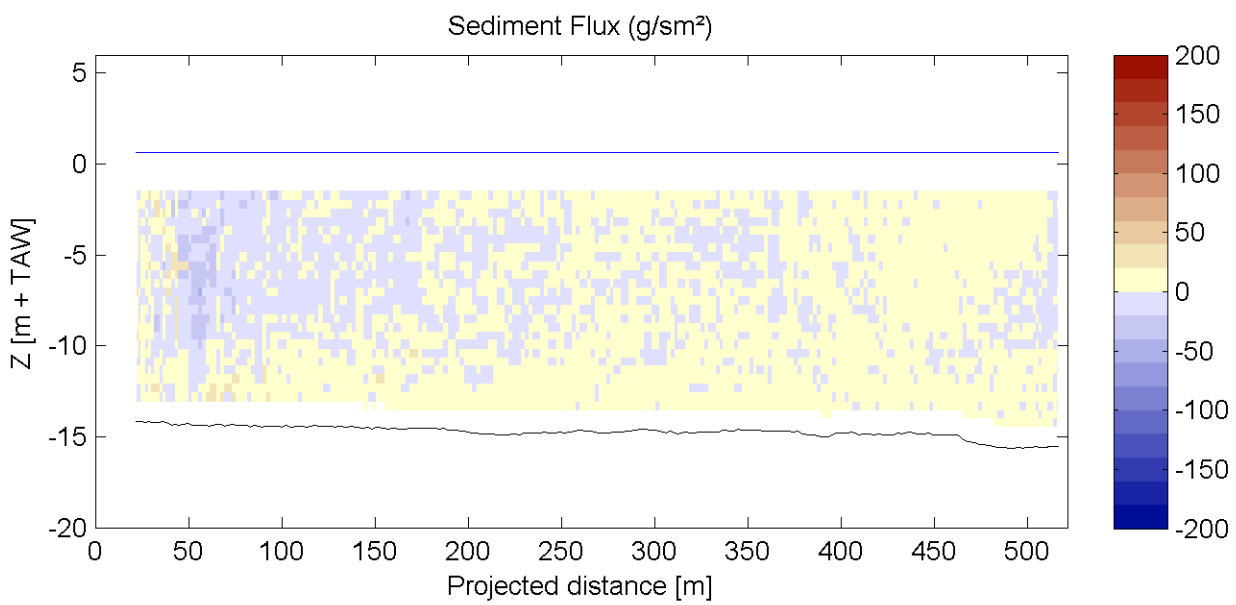
In association with : WL | delft hydraulics, GEMS International

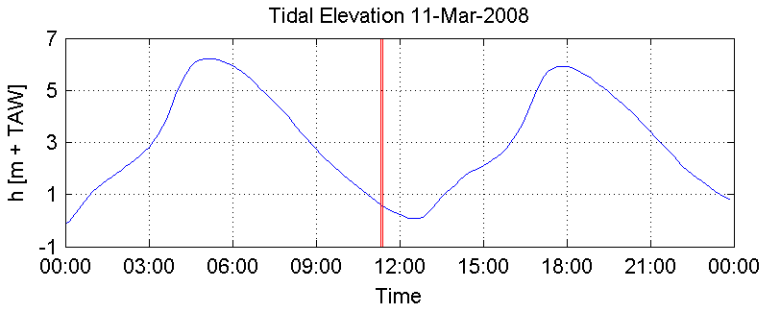
I/RA/11283/07.090/MSA

# Through Tide Sediview Measurement Spring tide 11/03/2008

| | |
|---|---|
| 11283 - Aanslibbing Deurganckdok | Equipment(s): ADCP |
| Sourcefile: 3037DGDs_sub.csv | Location: Transect DGD |




HW/LW:
05:00: h = 6.22 m+TAW
12:30: h = 0.08 m+TAW
17:50: h = 5.93 m+TAW

Date / Time [MET] :

11-Mar-2008

11:18 - 11:22

Time after HW [HH:MM]

6:20

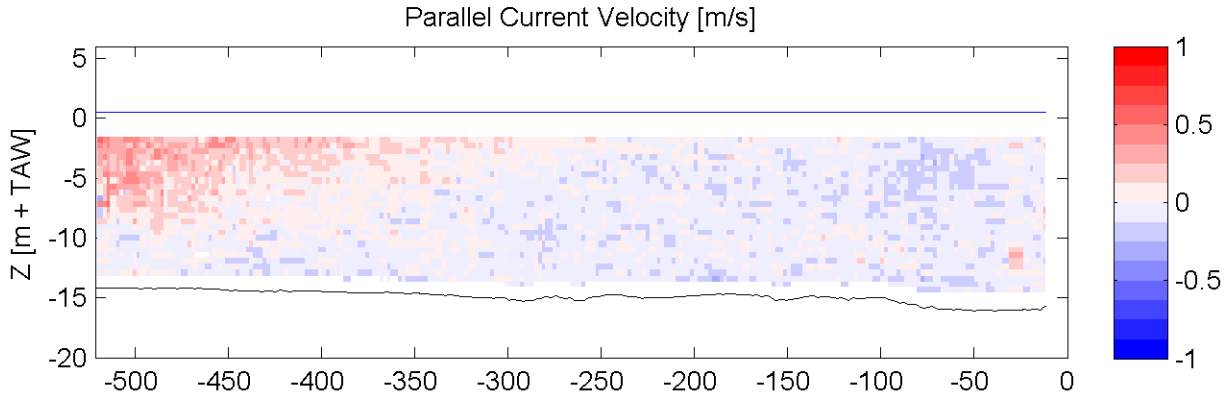
Data Processed by: IMDC

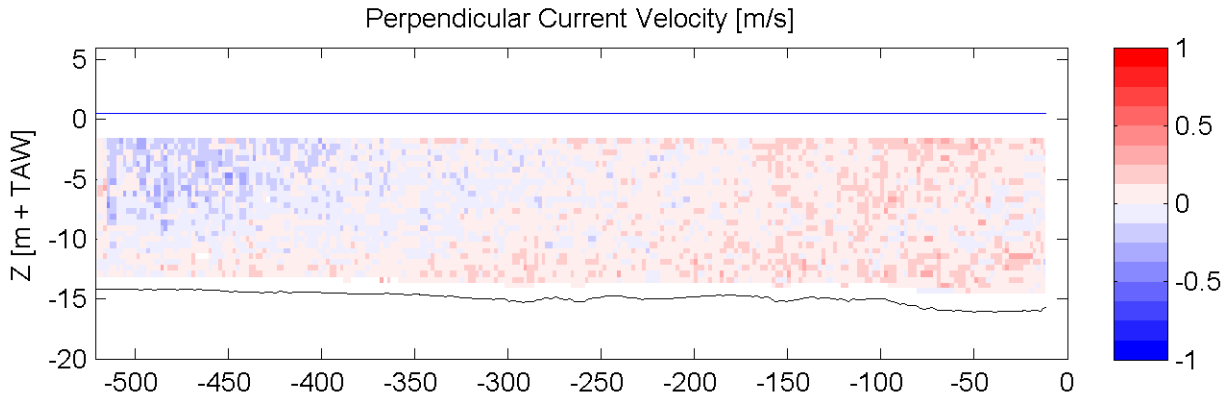
In association with : WL | delft hydraulics, GEMS International

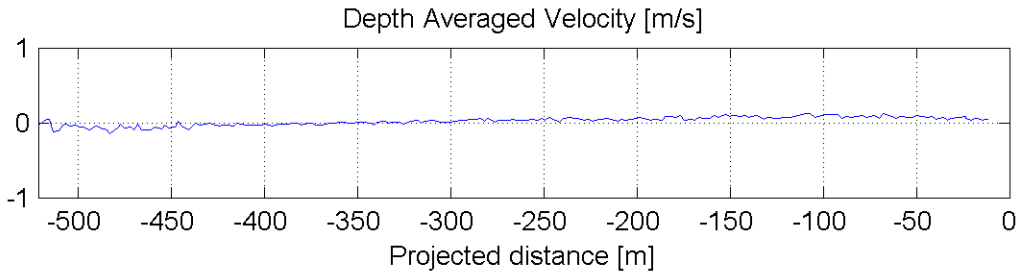
I/RA/11283/07.090/MSA

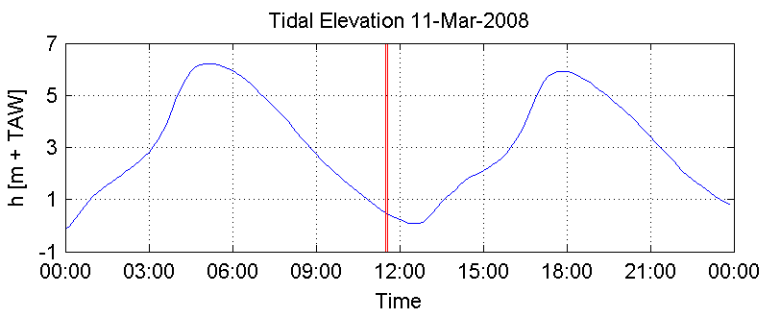
# Through Tide Sediview Measurement Spring tide 11/03/2008

| | |
|---|---|
| 11283 - Aanslibbing Deurganckdok | Equipment(s): ADCP |
| Sourcefile: 3039DGDt_sub.csv | Location: Transect DGD |




HW/LW: 05:00: h = 6.22 m+TAW
12:30: h = 0.08 m+TAW
17:50: h = 5.93 m+TAW

Date / Time [MET] :

11-Mar-2008

11:30 - 11:35

Time after HW [HH:MM]

6:32

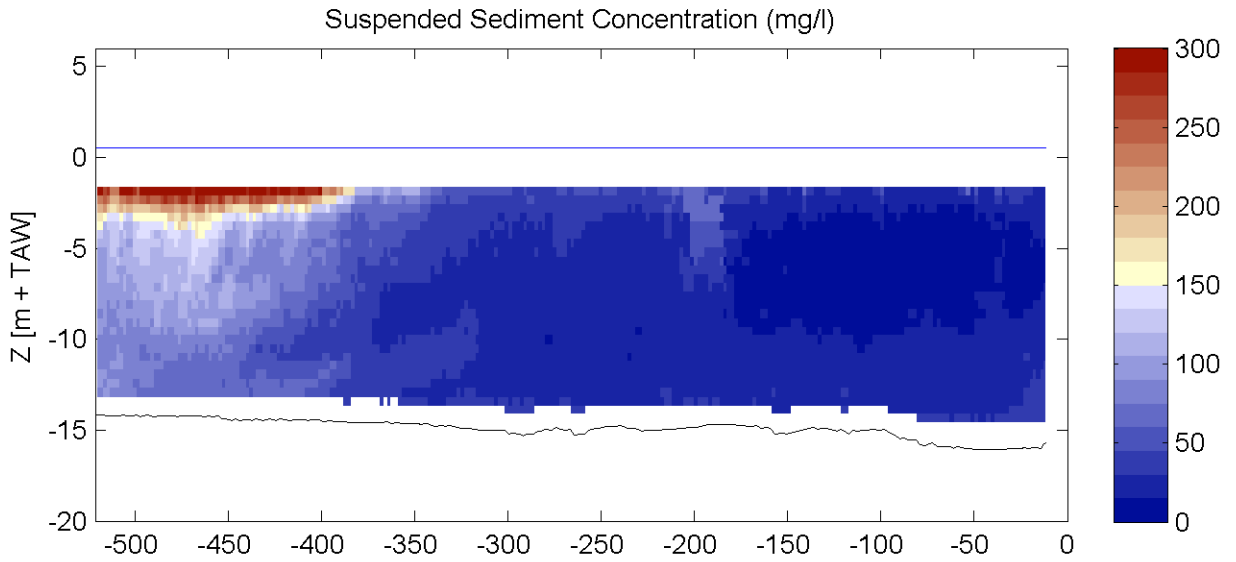
Data Processed by: IMDC

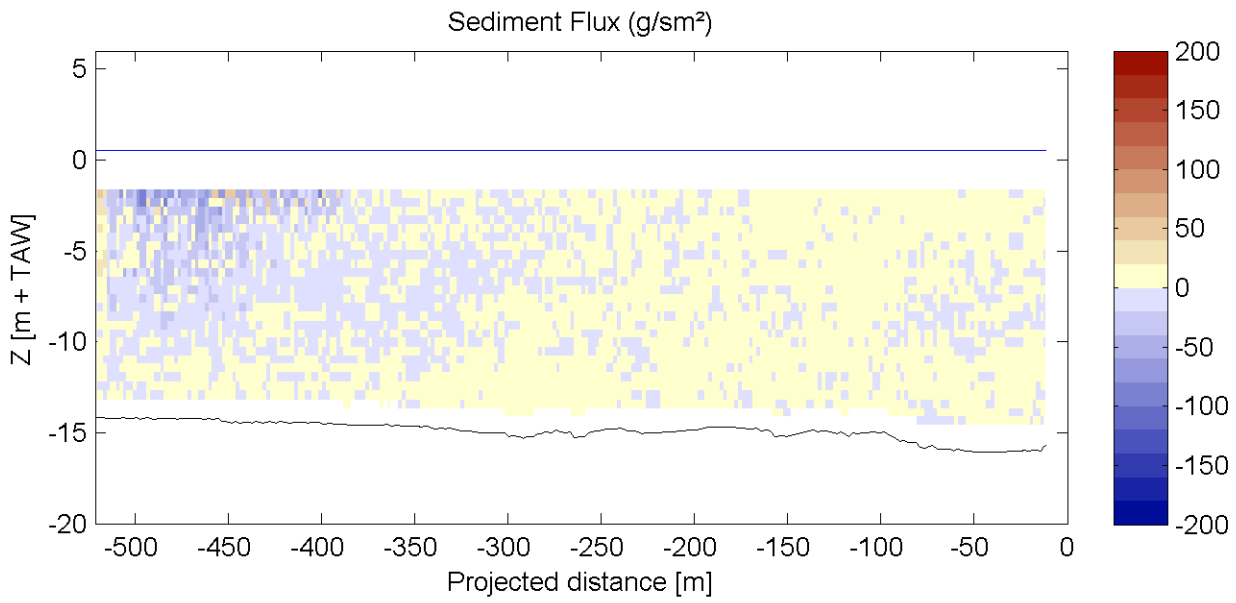
In association with : WL | delft hydraulics, GEMS International

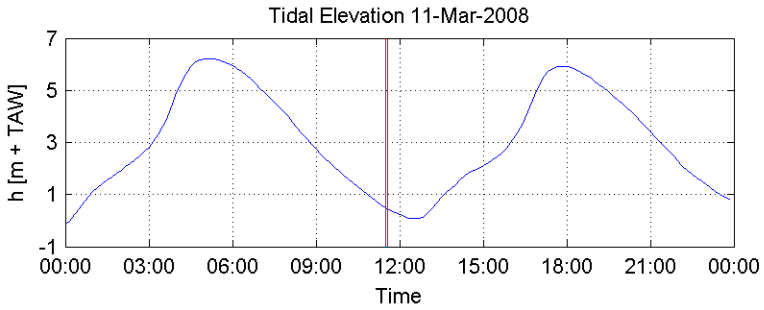
I/RA/11283/07.090/MSA

# Through Tide Sediview Measurement Spring tide 11/03/2008

| | |
|---|---|
| 11283 - Aanslibbing Deurganckdok | Equipment(s): ADCP |
| Sourcefile: 3039DGDt_sub.csv | Location: Transect DGD |




HW/LW: 05:00: h = 6.22 m+TAW
12:30: h = 0.08 m+TAW
17:50: h = 5.93 m+TAW

Date / Time [MET] :

11-Mar-2008

11:30 - 11:35

Time after HW [HH:MM]

6:32

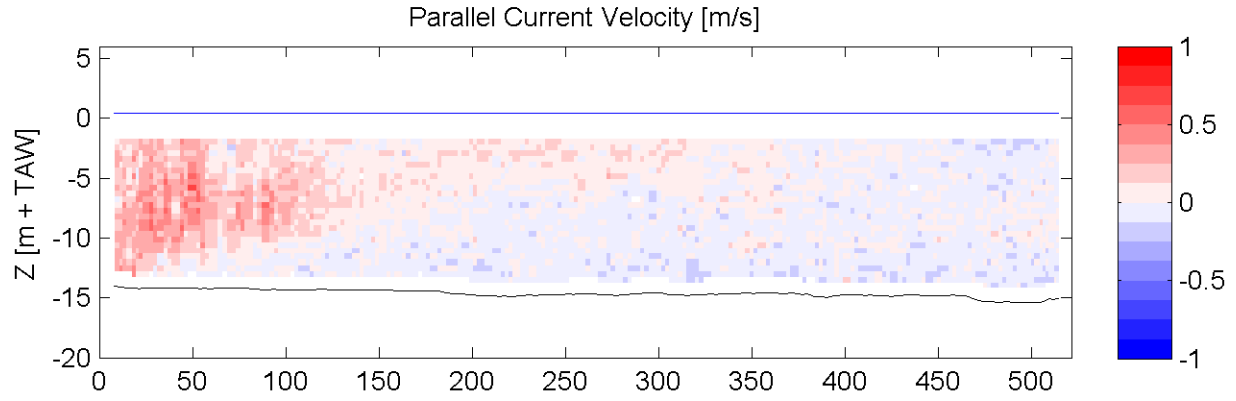
Data Processed by: IMDC

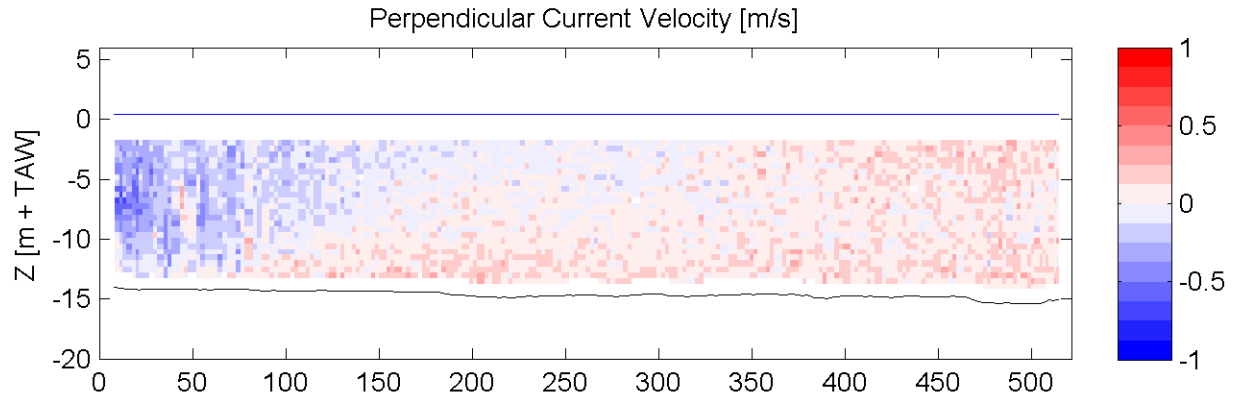
In association with : WL | delft hydraulics, GEMS International

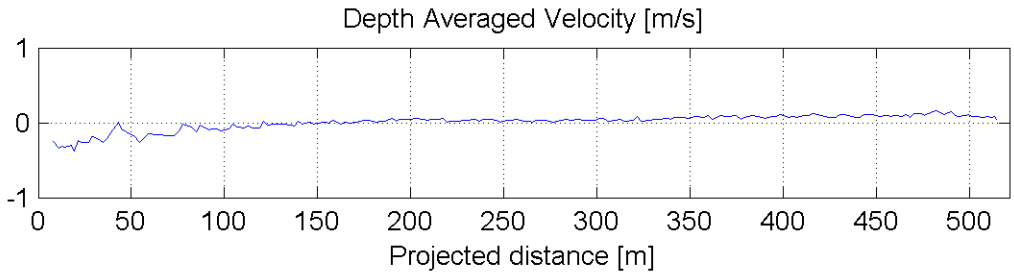
I/RA/11283/07.090/MSA

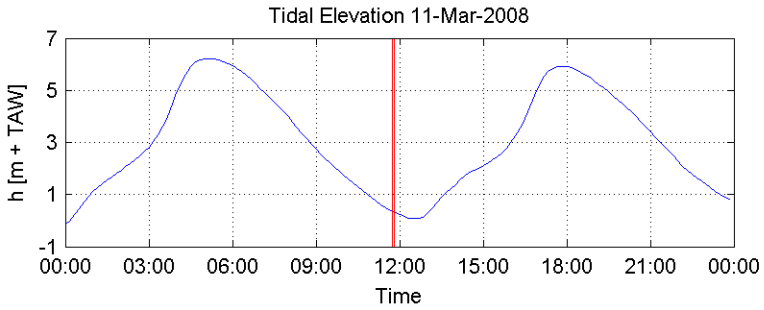
# Through Tide Sediview Measurement Spring tide 11/03/2008

| | |
|---|---|
| 11283 - Aanslibbing Deurganckdok | Equipment(s): ADCP |
| Sourcefile: 3041DGDs_sub.csv | Location: Transect DGD |




HW/LW: 05:00: h = 6.22 m+TAW
12:30: h = 0.08 m+TAW
17:50: h = 5.93 m+TAW

Date / Time [MET] :

11-Mar-2008

11:44 - 11:48

Time after HW [HH:MM]

6:46

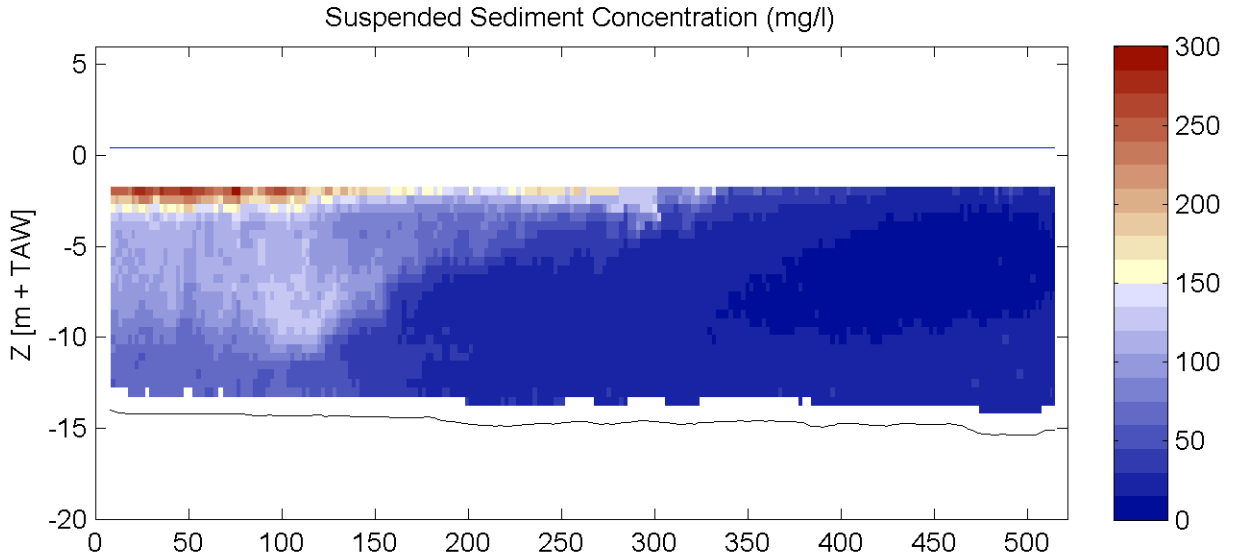
Data Processed by: IMDC

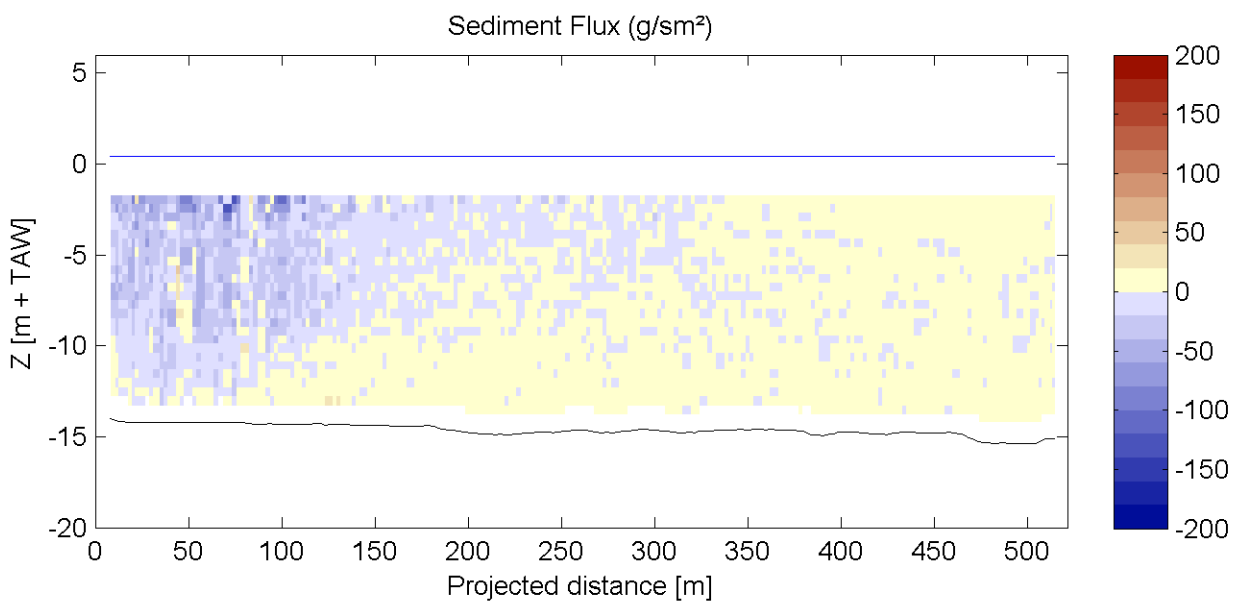
In association with : WL | delft hydraulics, GEMS International

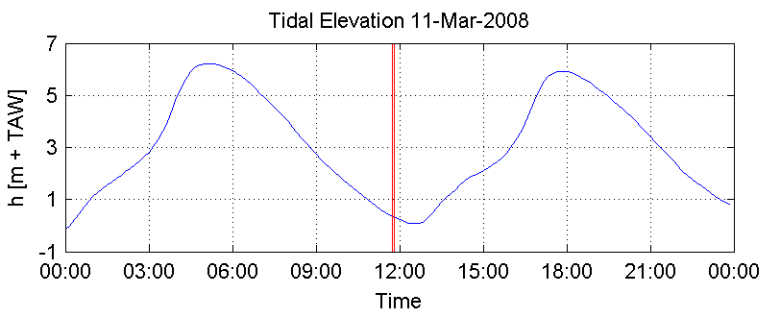
I/RA/11283/07.090/MSA

# Through Tide Sediview Measurement Spring tide 11/03/2008

| | |
|---|---|
| 11283 - Aanslibbing Deurganckdok | Equipment(s): ADCP |
| Sourcefile: 3041DGDs_sub.csv | Location: Transect DGD |




HW/LW:
05:00: h = 6.22 m+TAW
12:30: h = 0.08 m+TAW
17:50: h = 5.93 m+TAW

Date / Time [MET] :

11-Mar-2008

11:44 - 11:48

Time after HW [HH:MM]

6:46

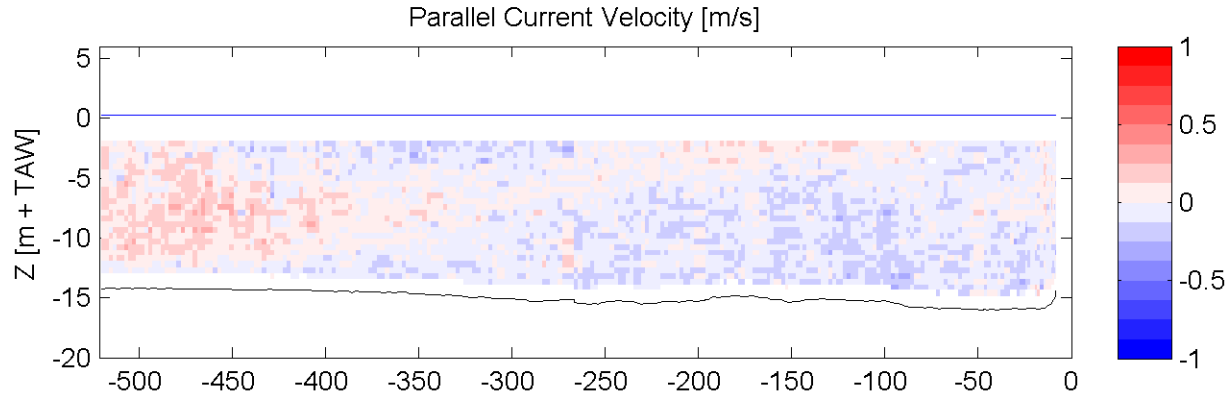
Data Processed by: IMDC

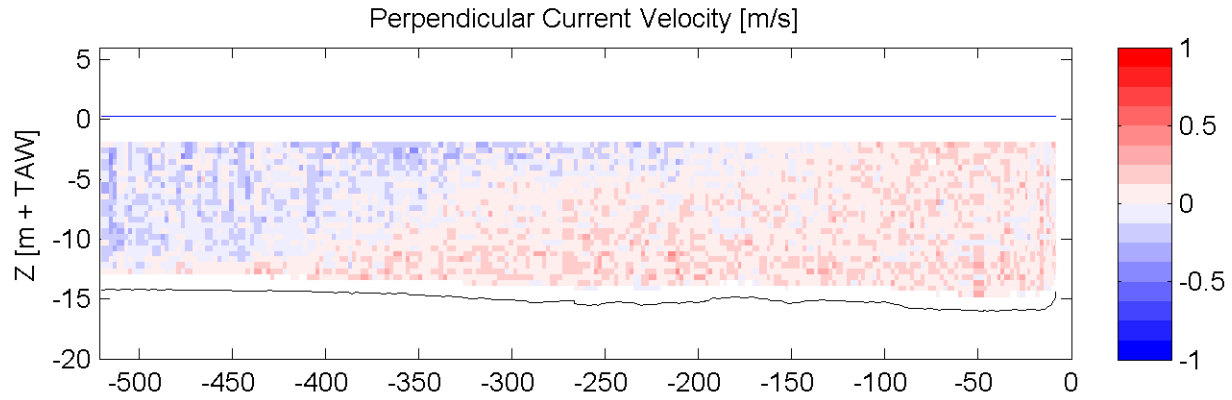
In association with : WL | delft hydraulics, GEMS International

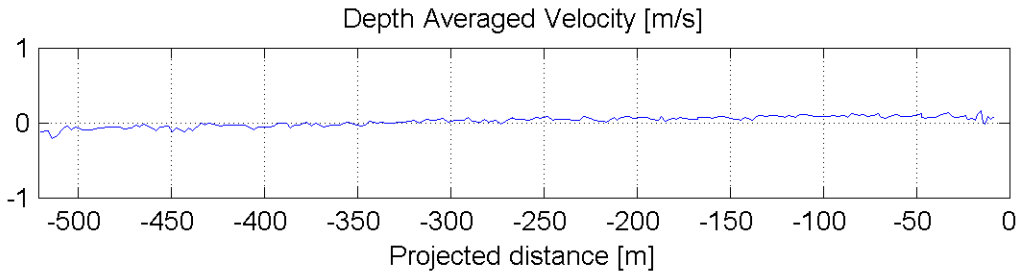
I/RA/11283/07.090/MSA

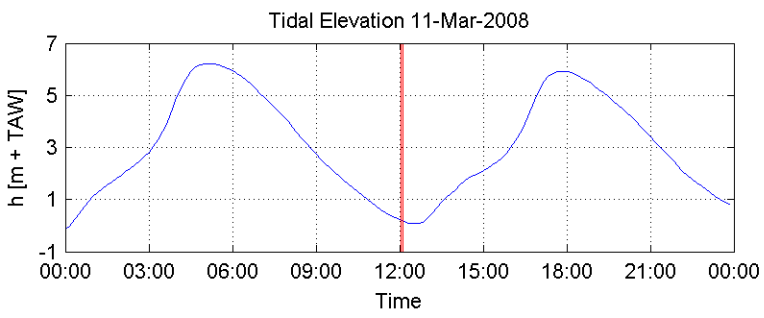
# Through Tide Sediview Measurement Spring tide 11/03/2008

| | |
|---|---|
| 11283 - Aanslibbing Deurganckdok | Equipment(s): ADCP |
| Sourcefile: 3043DGDt_sub.csv | Location: Transect DGD |




HW/LW:
05:00: h = 6.22 m+TAW
12:30: h = 0.08 m+TAW
17:50: h = 5.93 m+TAW

Date / Time [MET] :

11-Mar-2008

12:02 - 12:06

Time after HW [HH:MM]

7:04

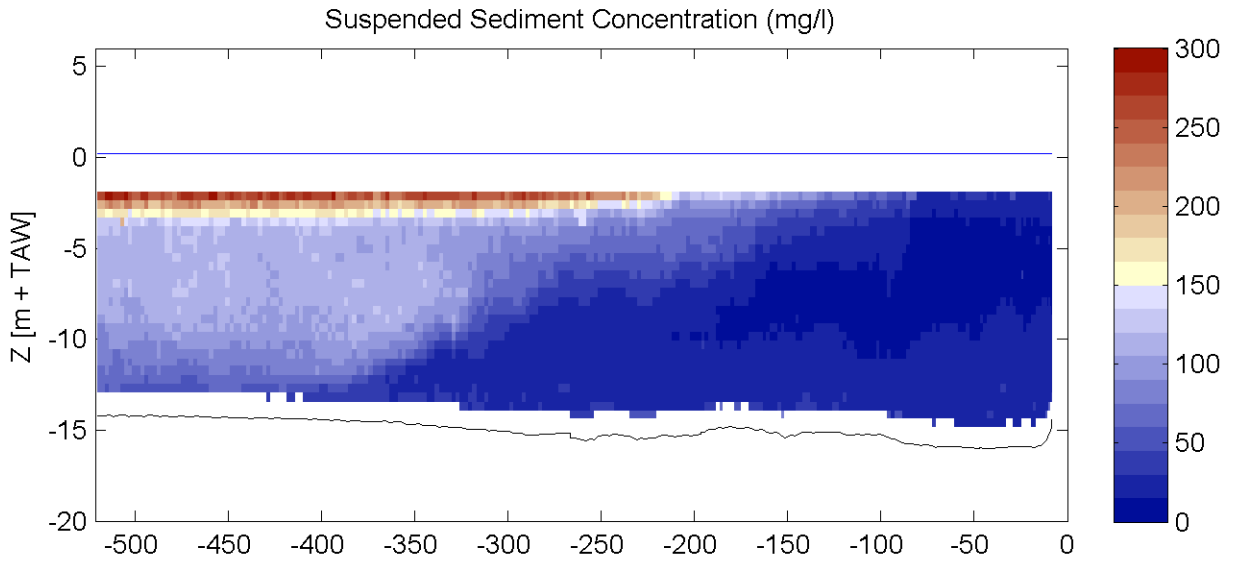
Data Processed by: IMDC

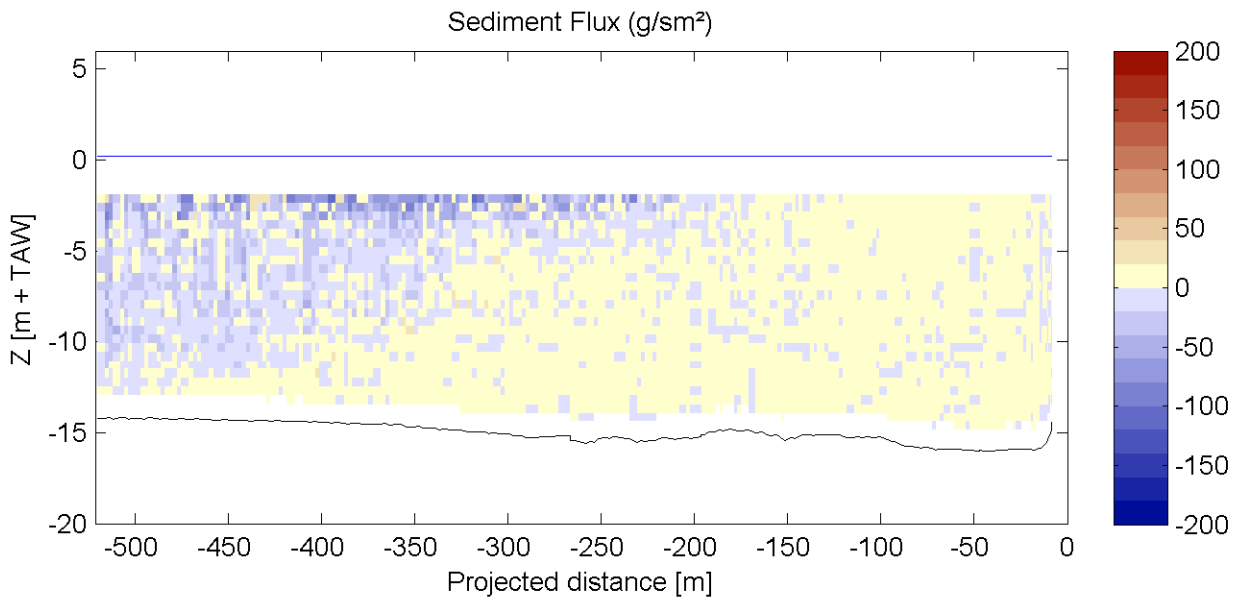
In association with : WL | delft hydraulics, GEMS International

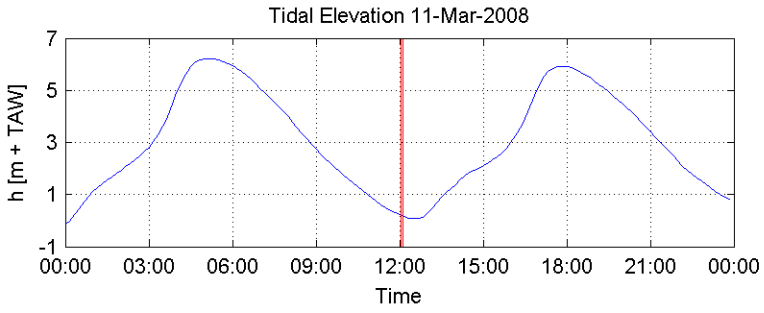
I/RA/11283/07.090/MSA

# Through Tide Sediview Measurement Spring tide 11/03/2008

| | |
|---|---|
| 11283 - Aanslibbing Deurganckdok | Equipment(s): ADCP |
| Sourcefile: 3043DGDt_sub.csv | Location: Transect DGD |




HW/LW:
05:00: h = 6.22 m+TAW
12:30: h = 0.08 m+TAW
17:50: h = 5.93 m+TAW

Date / Time [MET] :

11-Mar-2008

12:02 - 12:06

Time after HW [HH:MM]

7:04

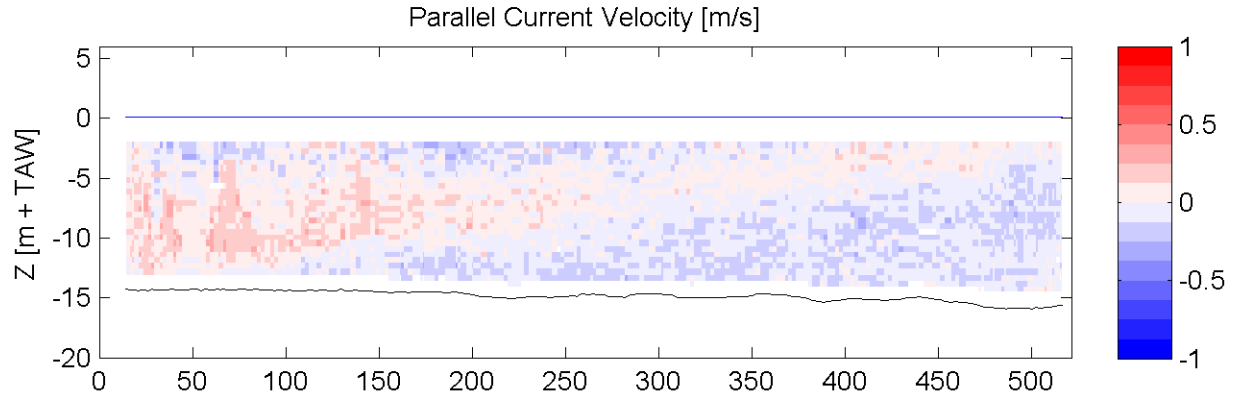
Data Processed by: IMDC

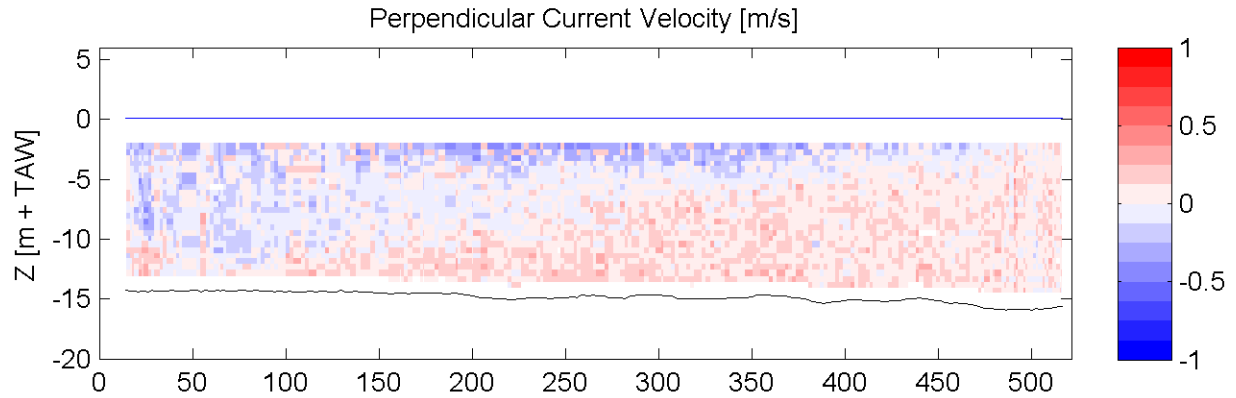
In association with : WL | delft hydraulics, GEMS International

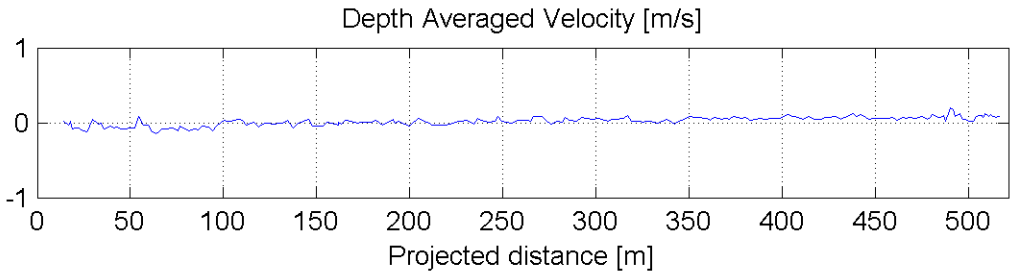
I/RA/11283/07.090/MSA

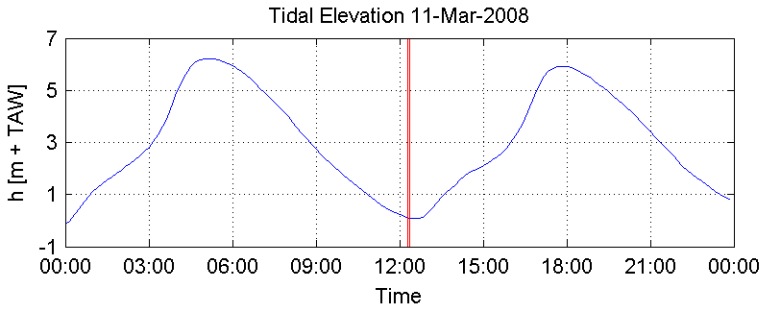
# Through Tide Sediview Measurement Spring tide 11/03/2008

| | |
|---|---|
| 11283 - Aanslibbing Deurganckdok | Equipment(s): ADCP |
| Sourcefile: 3045DGDs_sub.csv | Location: Transect DGD |




HW/LW: 05:00: h = 6.22 m+TAW
12:30: h = 0.08 m+TAW
17:50: h = 5.93 m+TAW

Date / Time [MET] :

11-Mar-2008

12:18 - 12:22

Time after HW [HH:MM]

7:20

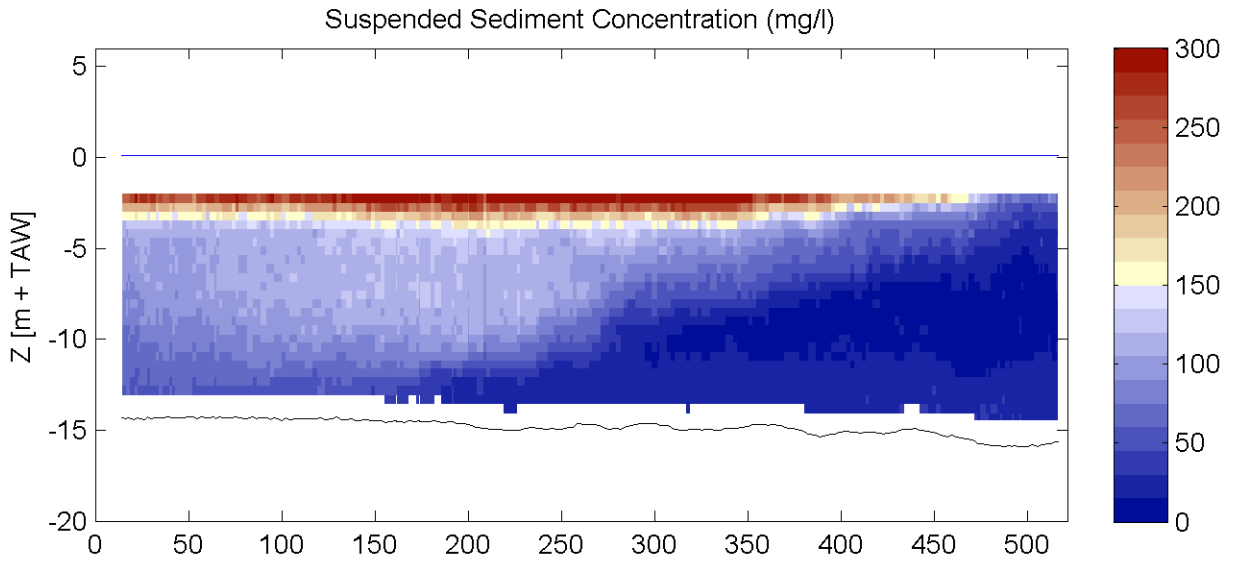
Data Processed by: IMDC

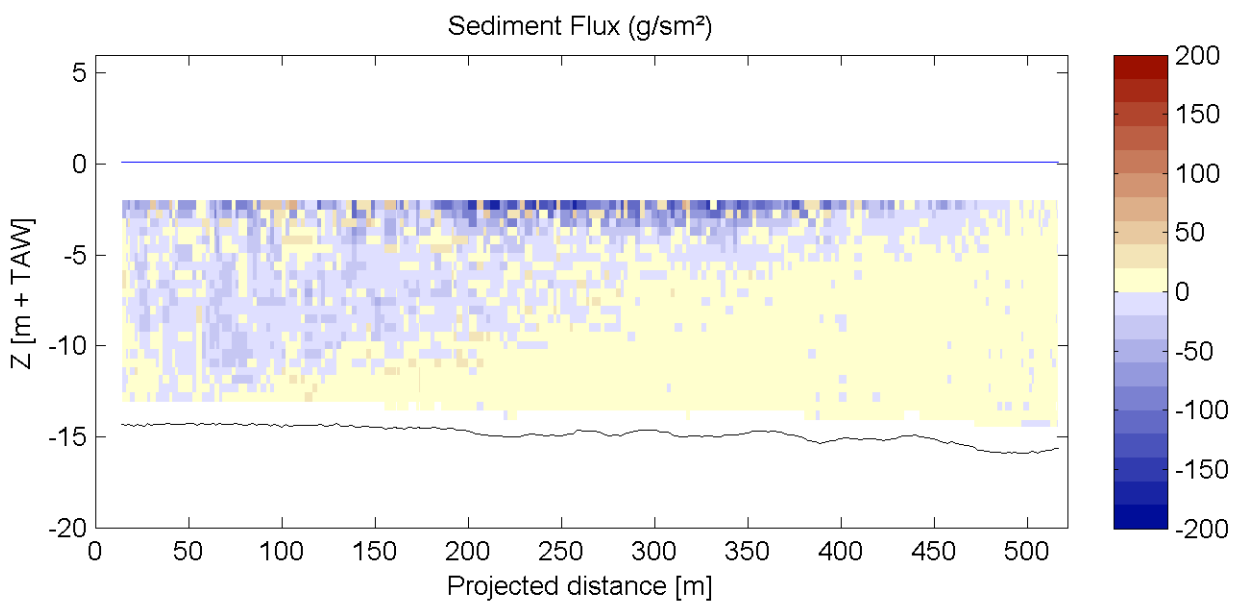
In association with : w.l | delft hydraulics, GEMS International

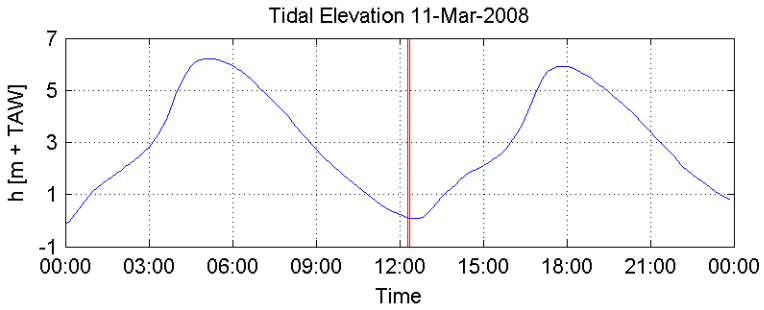
I/RA/11283/07.090/MSA

# Through Tide Sediview Measurement Spring tide 11/03/2008

| | |
|---|---|
| 11283 - Aanslibbing Deurganckdok | Equipment(s): ADCP |
| Sourcefile: 3045DGDs_sub.csv | Location: Transect DGD |




HW/LW:
05:00: h = 6.22 m+TAW
12:30: h = 0.08 m+TAW
17:50: h = 5.93 m+TAW

Date / Time [MET] :

11-Mar-2008

12:18 - 12:22

Time after HW [HH:MM]

7:20

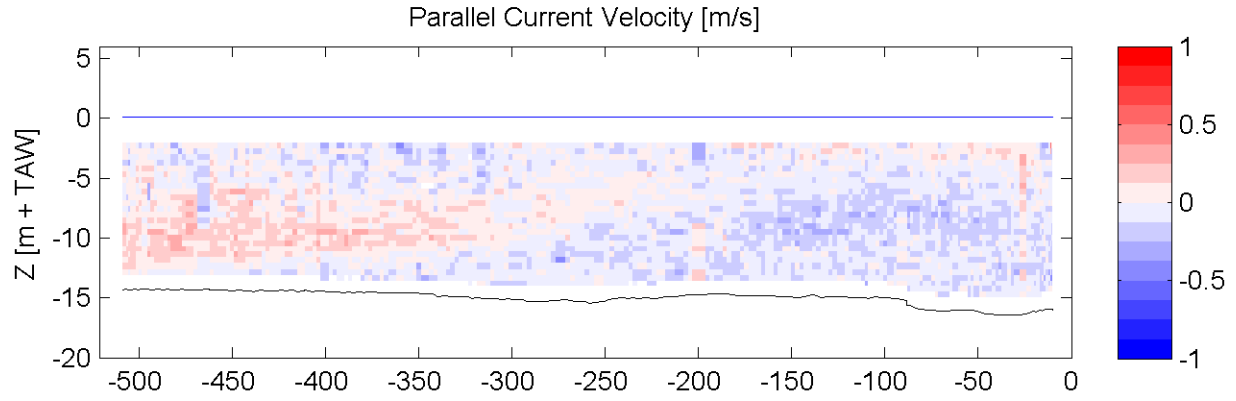
Data Processed by: IMDC

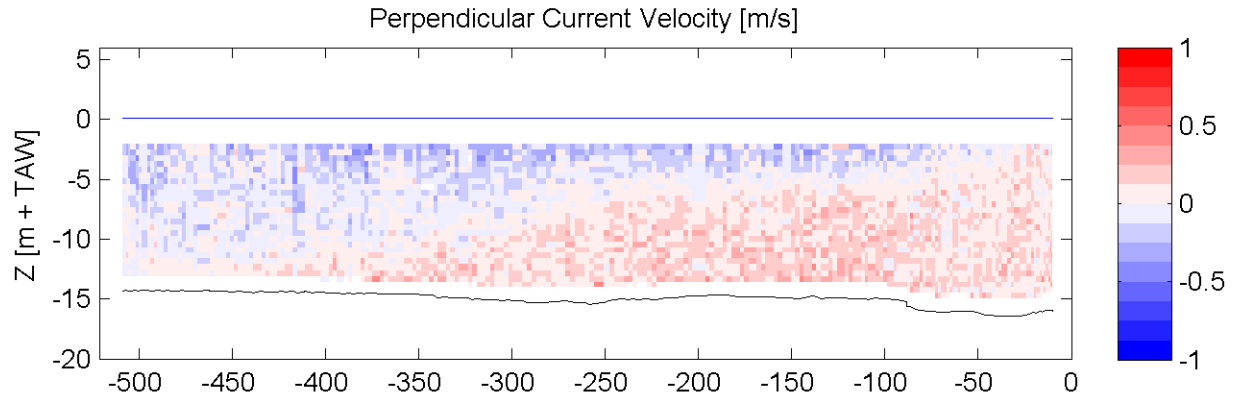
In association with : WL | delft hydraulics, GEMS International

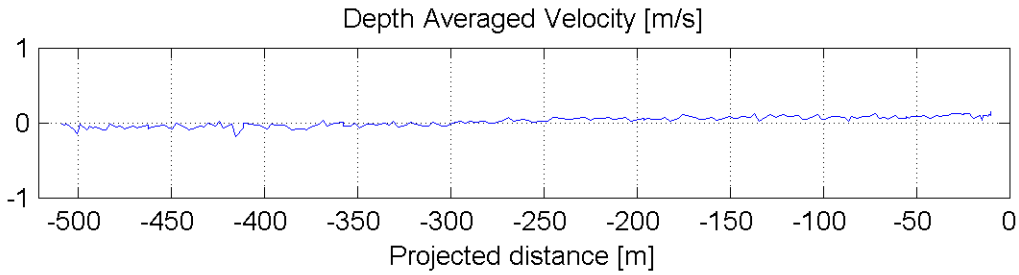
I/RA/11283/07.090/MSA

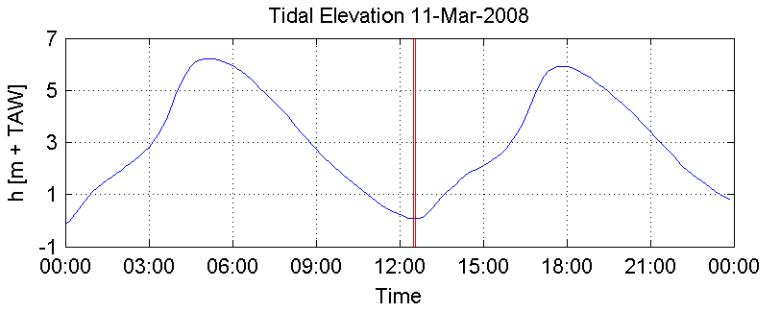
# Through Tide Sediview Measurement Spring tide 11/03/2008

| | |
|---|---|
| 11283 - Aanslibbing Deurganckdok | Equipment(s): ADCP |
| Sourcefile: 3047DGDt_sub.csv | Location: Transect DGD |




HW/LW: 05:00: h = 6.22 m+TAW
12:30: h = 0.08 m+TAW
17:50: h = 5.93 m+TAW

Date / Time [MET] :

11-Mar-2008

12:29 - 12:34

Time after HW [HH:MM]

-5:18

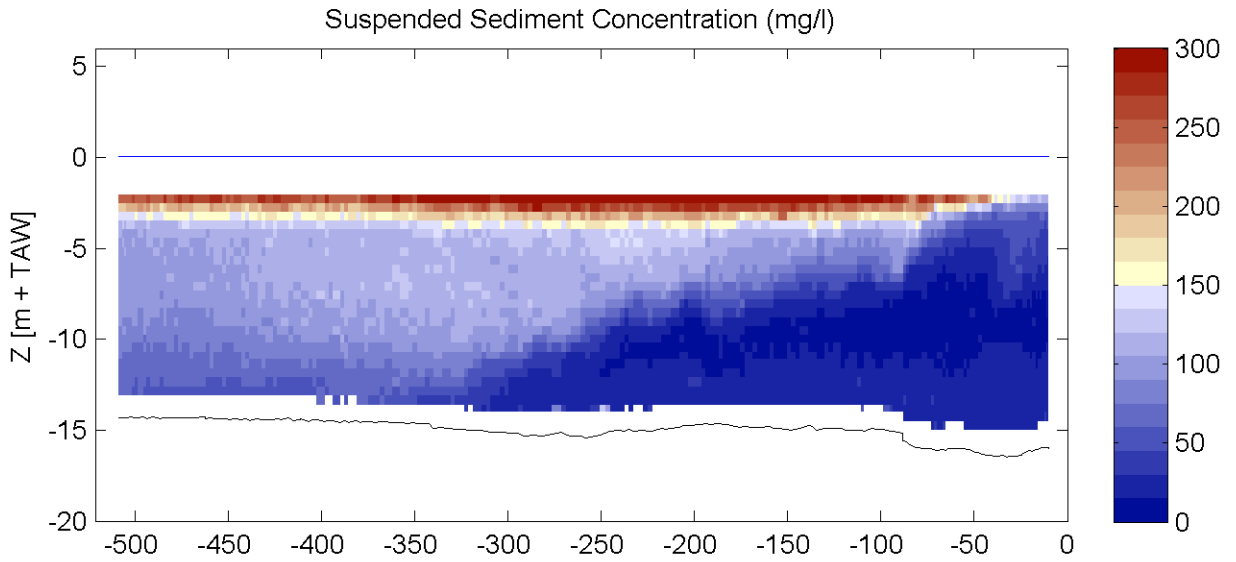
Data Processed by: IMDC

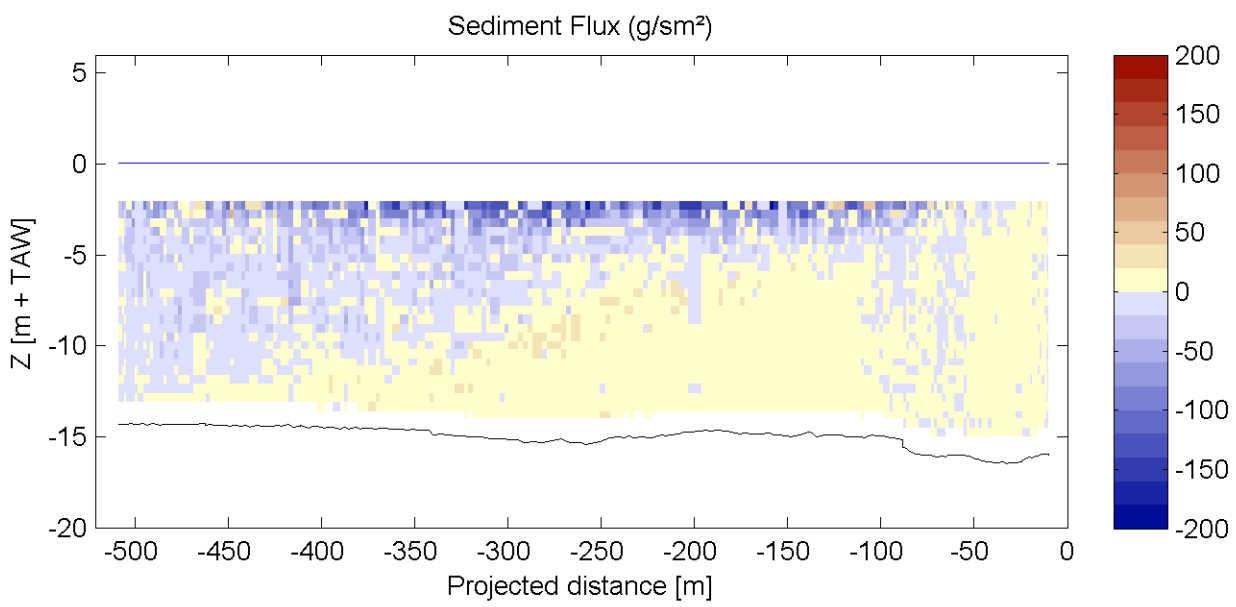
In association with : w.l | delft hydraulics, GEMS International

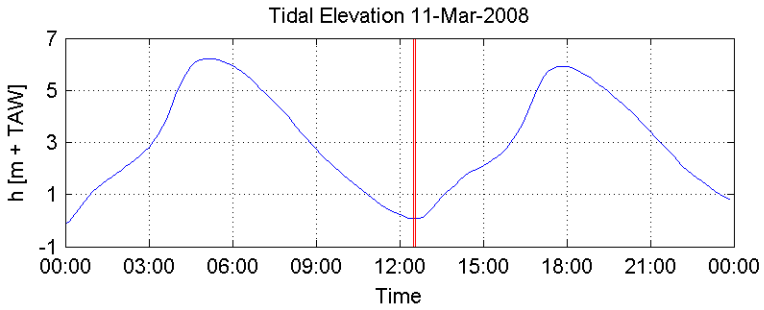
I/RA/11283/07.090/MSA

# Through Tide Sediview Measurement Spring tide 11/03/2008

| | |
|---|---|
| 11283 - Aanslibbing Deurganckdok | Equipment(s): ADCP |
| Sourcefile: 3047DGDt_sub.csv | Location: Transect DGD |




HW/LW:
05:00: h = 6.22 m+TAW
12:30: h = 0.08 m+TAW
17:50: h = 5.93 m+TAW

Date / Time [MET] :

11-Mar-2008

12:29 - 12:34

Time after HW [HH:MM]

-5:18

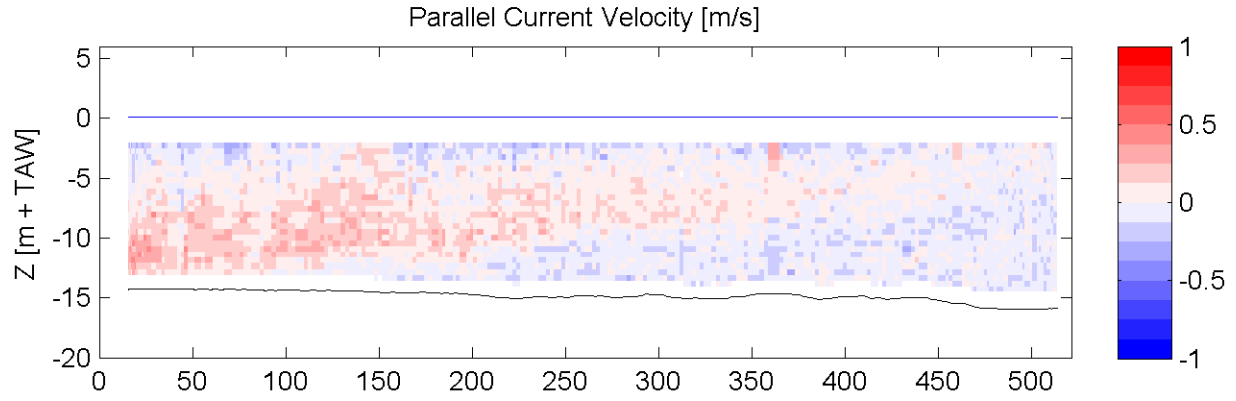
Data Processed by: IMDC

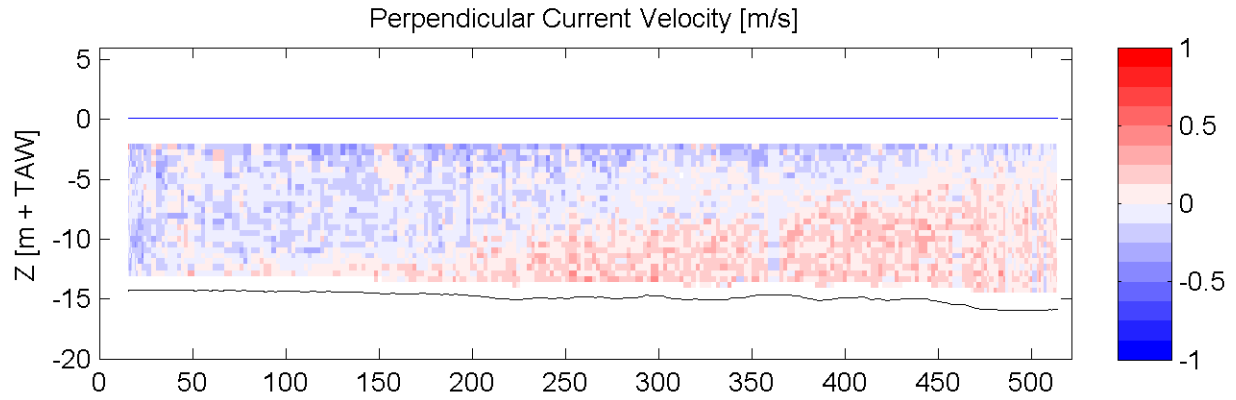
In association with : WL | delft hydraulics, GEMS International

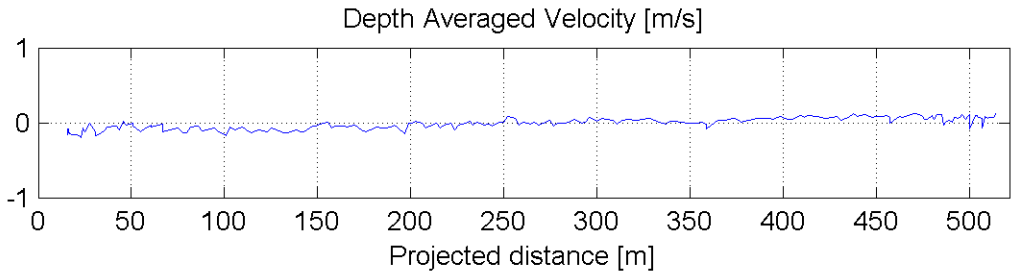
I/RA/11283/07.090/MSA

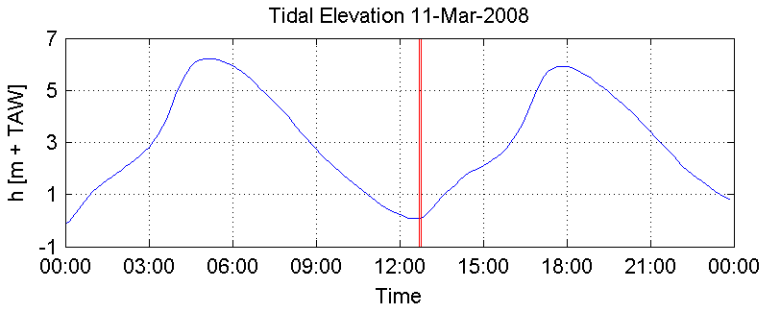
# Through Tide Sediview Measurement Spring tide 11/03/2008

| | |
|---|---|
| 11283 - Aanslibbing Deurganckdok | Equipment(s): ADCP |
| Sourcefile: 3049DGDs_sub.csv | Location: Transect DGD |




HW/LW:
05:00: h = 6.22 m+TAW
12:30: h = 0.08 m+TAW
17:50: h = 5.93 m+TAW

Date / Time [MET] :

11-Mar-2008

12:42 - 12:47

Time after HW [HH:MM]

-5:05

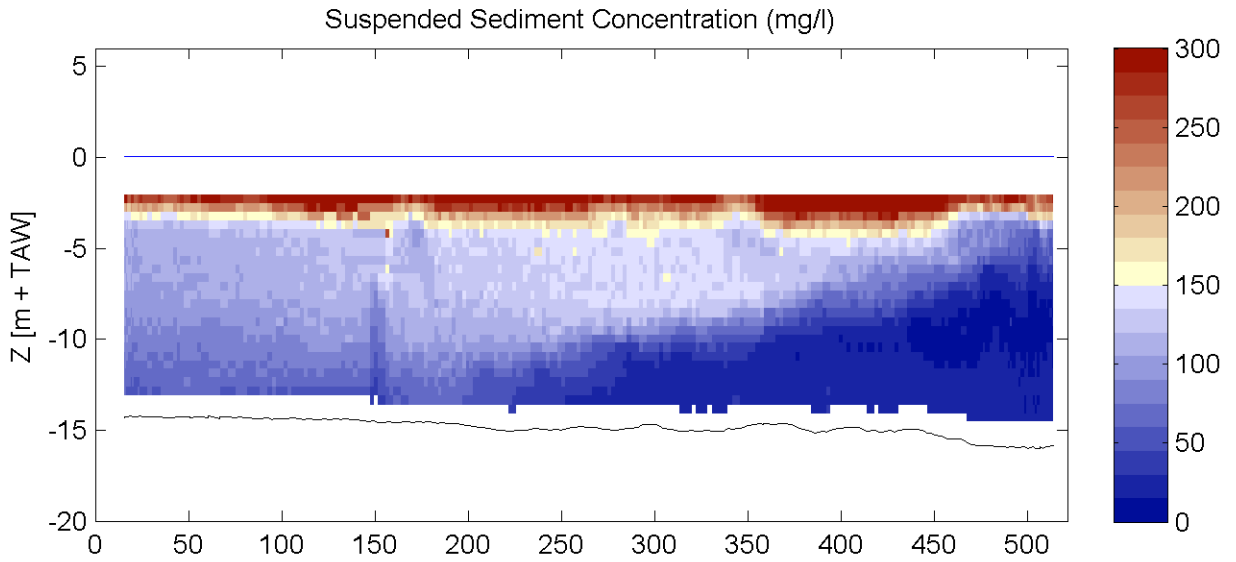
Data Processed by: IMDC

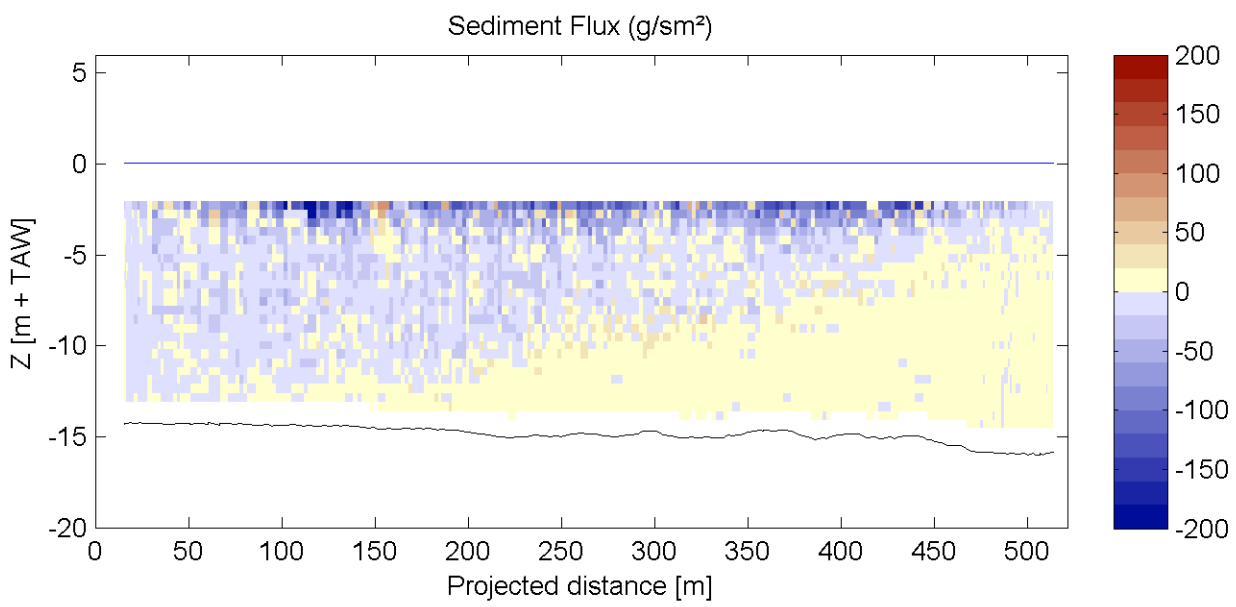
In association with : WL | delft hydraulics, GEMS International

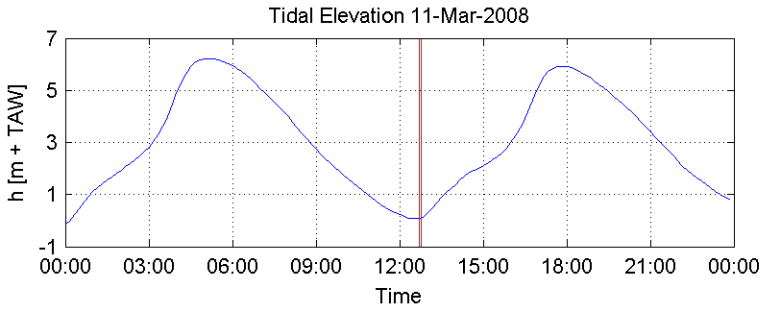
I/RA/11283/07.090/MSA

# Through Tide Sediview Measurement Spring tide 11/03/2008

| | |
|---|---|
| 11283 - Aanslibbing Deurganckdok | Equipment(s): ADCP |
| Sourcefile: 3049DGDs_sub.csv | Location: Transect DGD |




HW/LW:
05:00: h = 6.22 m+TAW
12:30: h = 0.08 m+TAW
17:50: h = 5.93 m+TAW

Date / Time [MET] :

11-Mar-2008

12:42 - 12:47

Time after HW [HH:MM]

-5:05

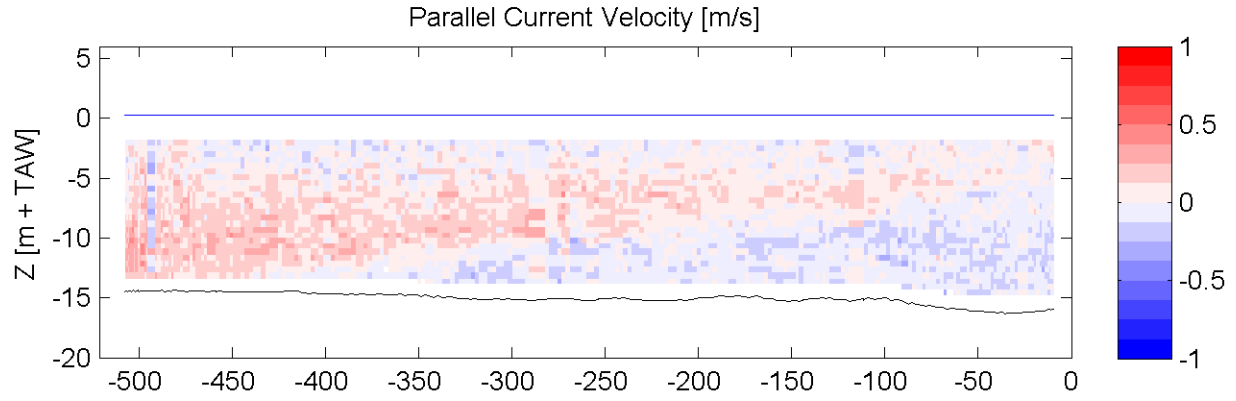
Data Processed by: IMDC

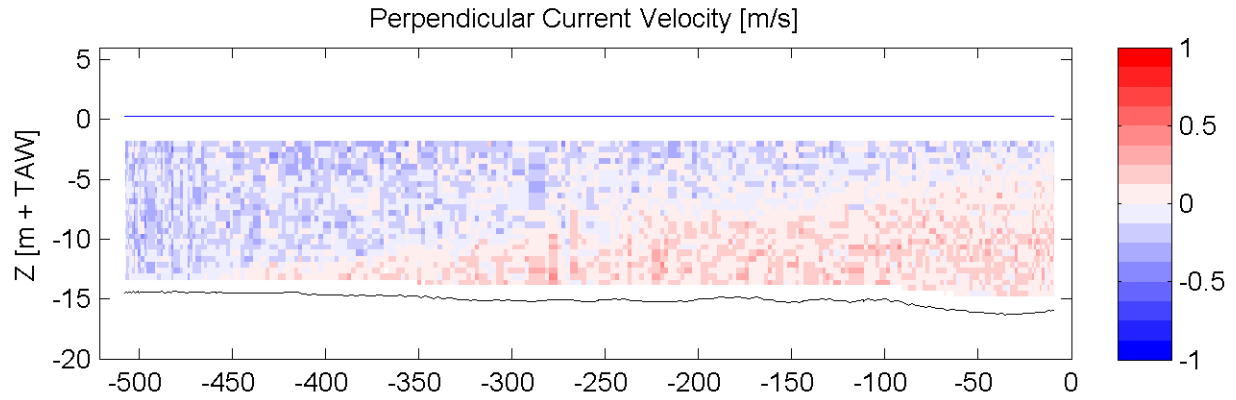
In association with : w.l | delft hydraulics, GEMS International

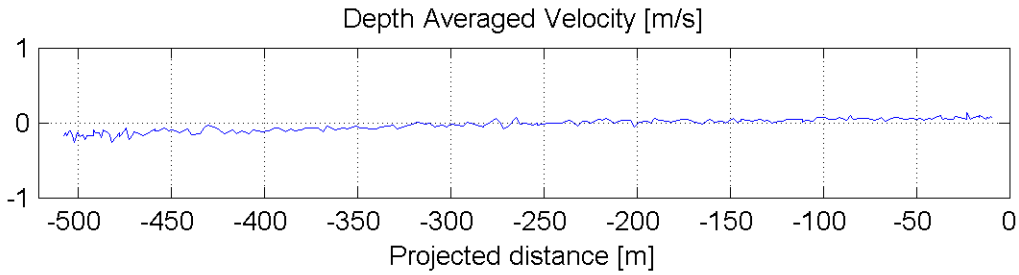
I/RA/11283/07.090/MSA

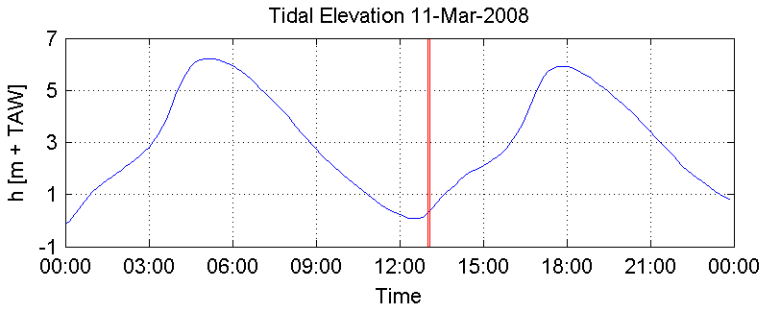
# Through Tide Sediview Measurement Spring tide 11/03/2008

| | |
|---|---|
| 11283 - Aanslibbing Deurganckdok | Equipment(s): ADCP |
| Sourcefile: 3051DGDt_sub.csv | Location: Transect DGD |




HW/LW: 05:00: h = 6.22 m+TAW
12:30: h = 0.08 m+TAW
17:50: h = 5.93 m+TAW

Date / Time [MET] :

11-Mar-2008

13:01 - 13:05

Time after HW [HH:MM]

-4:46

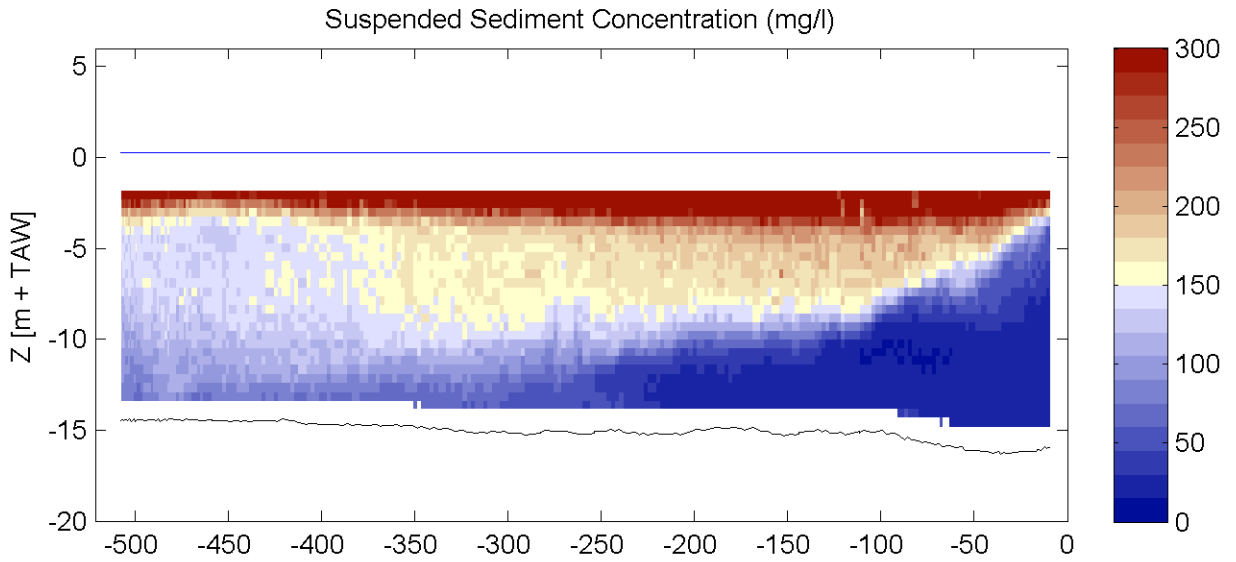
Data Processed by: IMDC

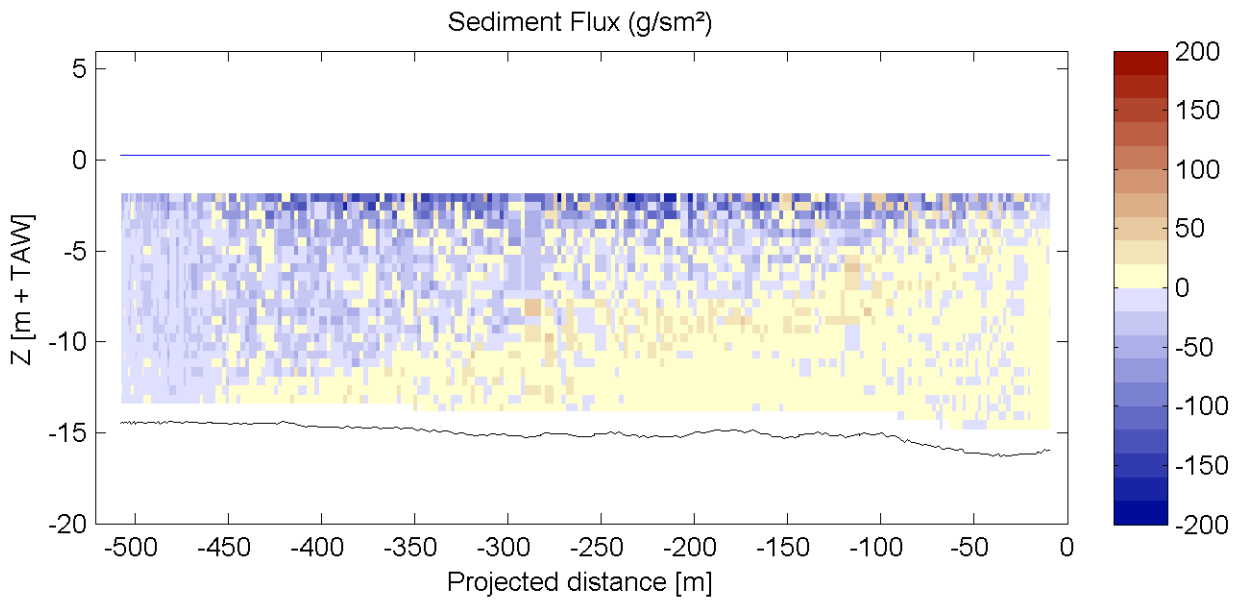
In association with : WL | delft hydraulics, GEMS International

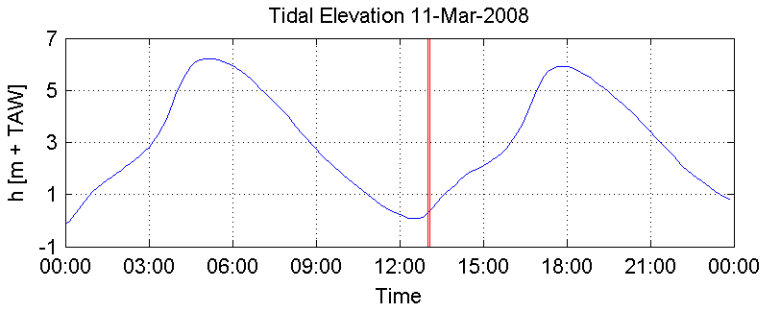
I/RA/11283/07.090/MSA

# Through Tide Sediview Measurement Spring tide 11/03/2008

| | |
|---|---|
| 11283 - Aanslibbing Deurganckdok | Equipment(s): ADCP |
| Sourcefile: 3051DGDt_sub.csv | Location: Transect DGD |




HW/LW:
05:00: h = 6.22 m+TAW
12:30: h = 0.08 m+TAW
17:50: h = 5.93 m+TAW

Date / Time [MET] :

11-Mar-2008

13:01 - 13:05

Time after HW [HH:MM]

-4:46

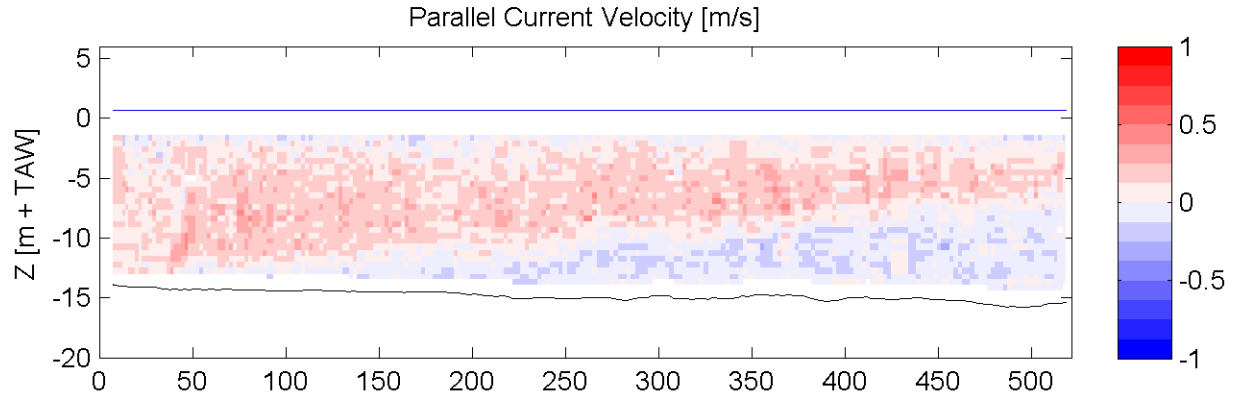
Data Processed by: IMDC

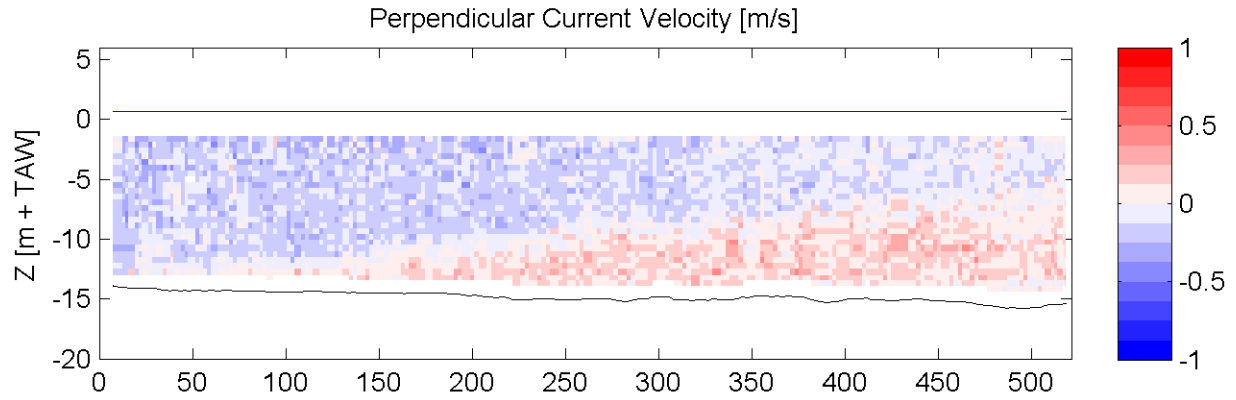
In association with : WL | delft hydraulics, GEMS International

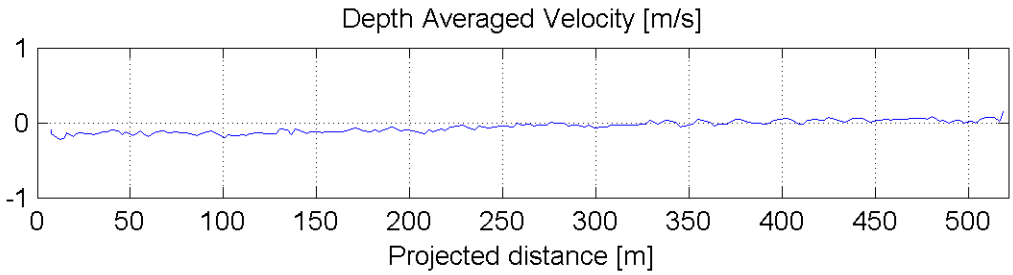
I/RA/11283/07.090/MSA

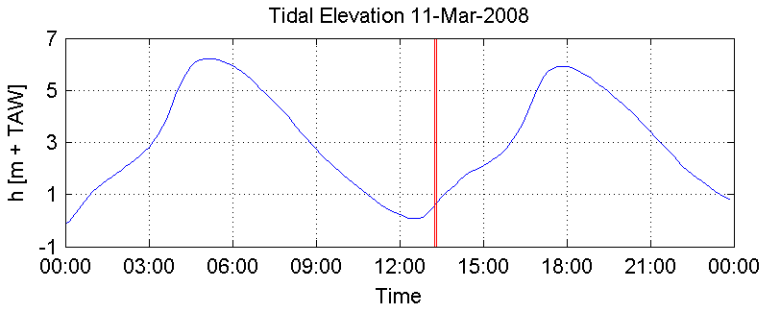
# Through Tide Sediview Measurement Spring tide 11/03/2008

| | |
|---|---|
| 11283 - Aanslibbing Deurganckdok | Equipment(s): ADCP |
| Sourcefile: 3053DGDt_sub.csv | Location: Transect DGD |




HW/LW: 05:00: h = 6.22 m+TAW
12:30: h = 0.08 m+TAW
17:50: h = 5.93 m+TAW

Date / Time [MET] :

11-Mar-2008

13:16 - 13:20

Time after HW [HH:MM]

-4:31

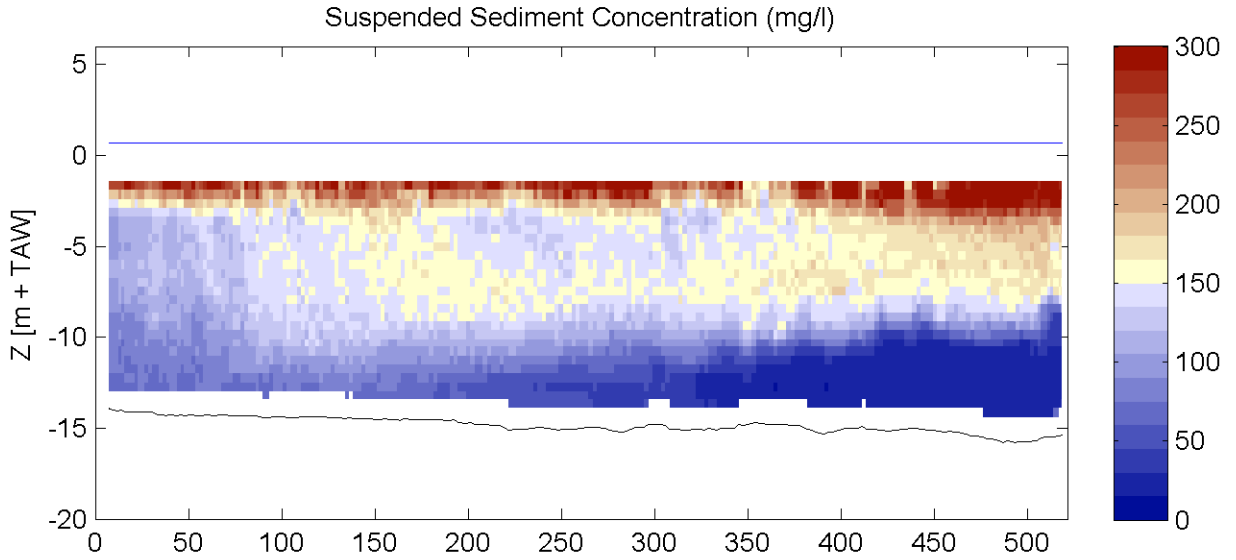
Data Processed by: IMDC

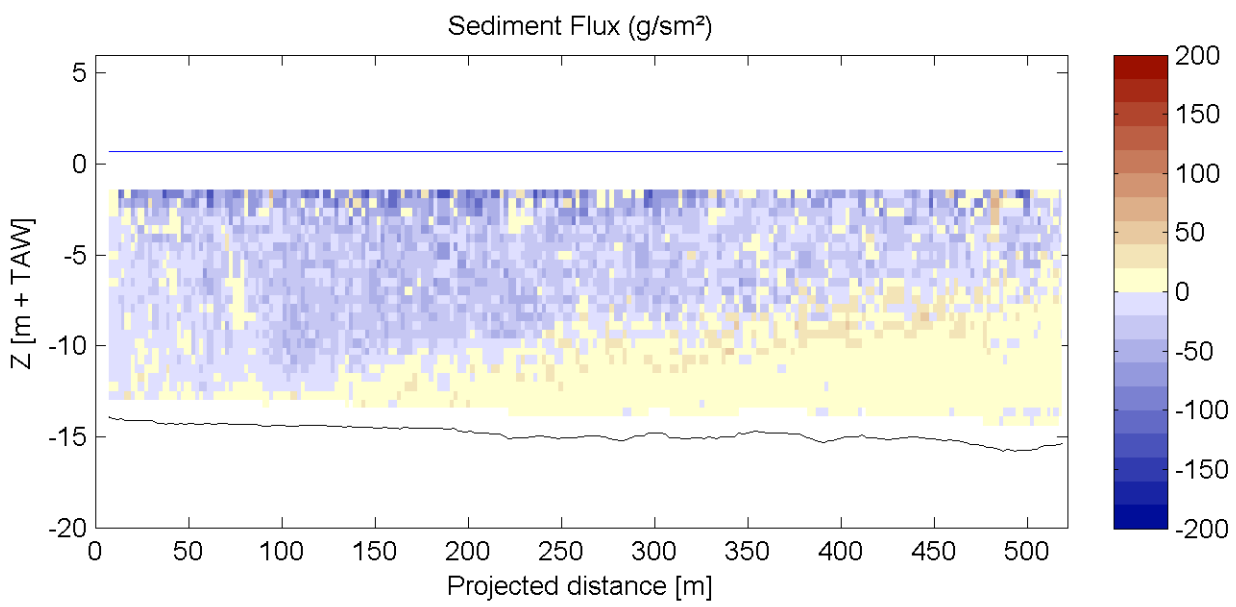
In association with : WL | delft hydraulics, GEMS International

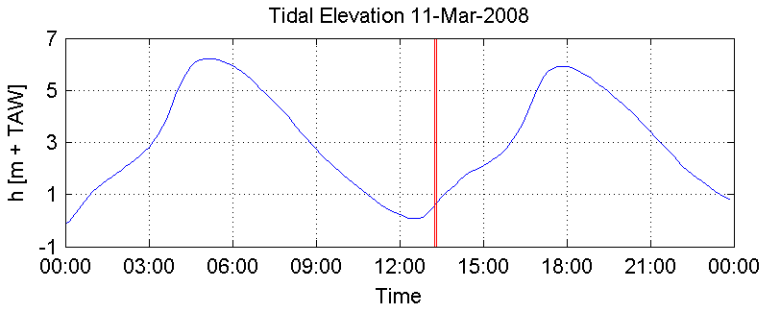
I/RA/11283/07.090/MSA

# Through Tide Sediview Measurement Spring tide 11/03/2008

| | |
|---|---|
| 11283 - Aanslibbing Deurganckdok | Equipment(s): ADCP |
| Sourcefile: 3053DGDt_sub.csv | Location: Transect DGD |




HW/LW:
05:00: h = 6.22 m+TAW
12:30: h = 0.08 m+TAW
17:50: h = 5.93 m+TAW

Date / Time [MET] :

11-Mar-2008

13:16 - 13:20

Time after HW [HH:MM]

-4:31

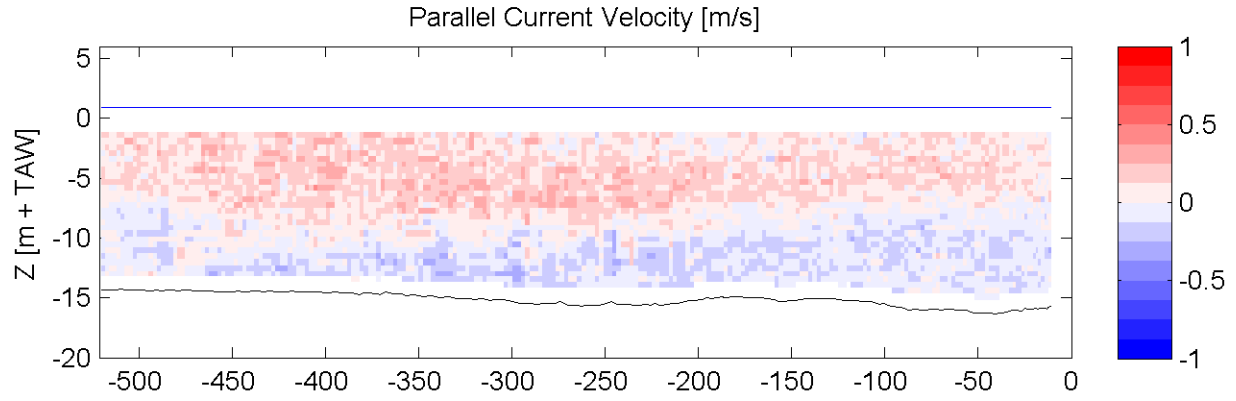
Data Processed by: IMDC

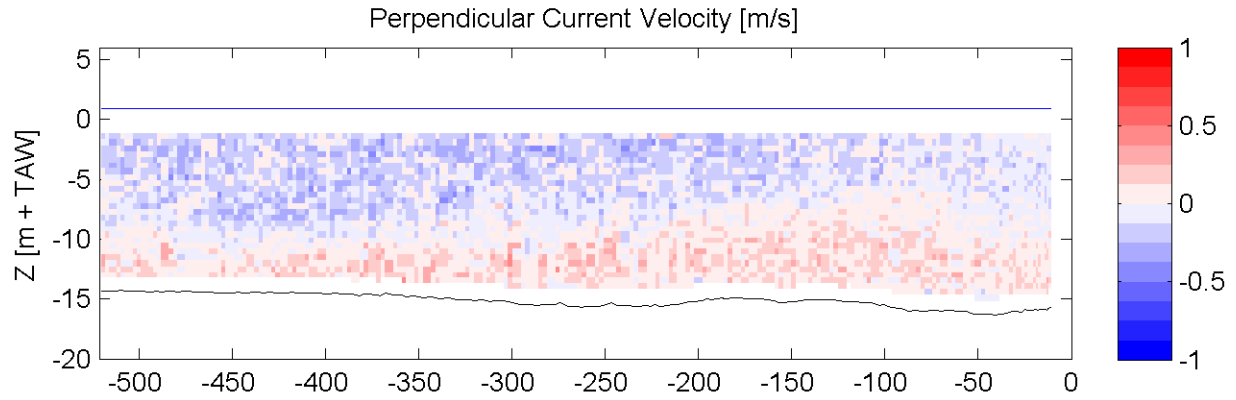
In association with : WL | delft hydraulics, GEMS International

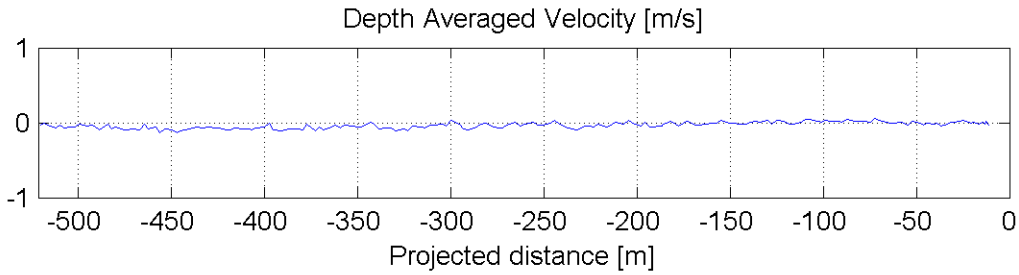
I/RA/11283/07.090/MSA

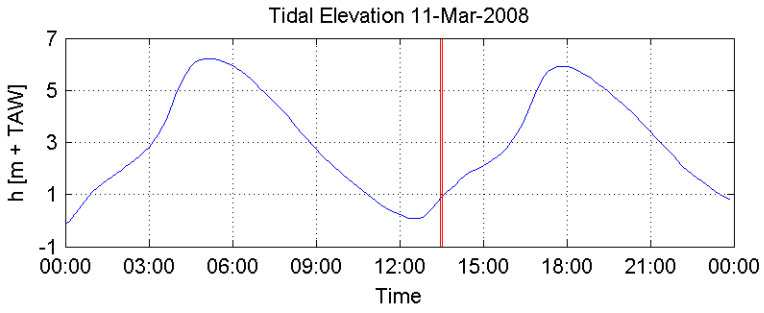
# Through Tide Sediview Measurement Spring tide 11/03/2008

| | |
|---|---|
| 11283 - Aanslibbing Deurganckdok | Equipment(s): ADCP |
| Sourcefile: 3055DGDt_sub.csv | Location: Transect DGD |




HW/LW: 05:00: h = 6.22 m+TAW
12:30: h = 0.08 m+TAW
17:50: h = 5.93 m+TAW

Date / Time [MET] :

11-Mar-2008

13:27 - 13:31

Time after HW [HH:MM]

-4:20

Data Processed by: IMDC

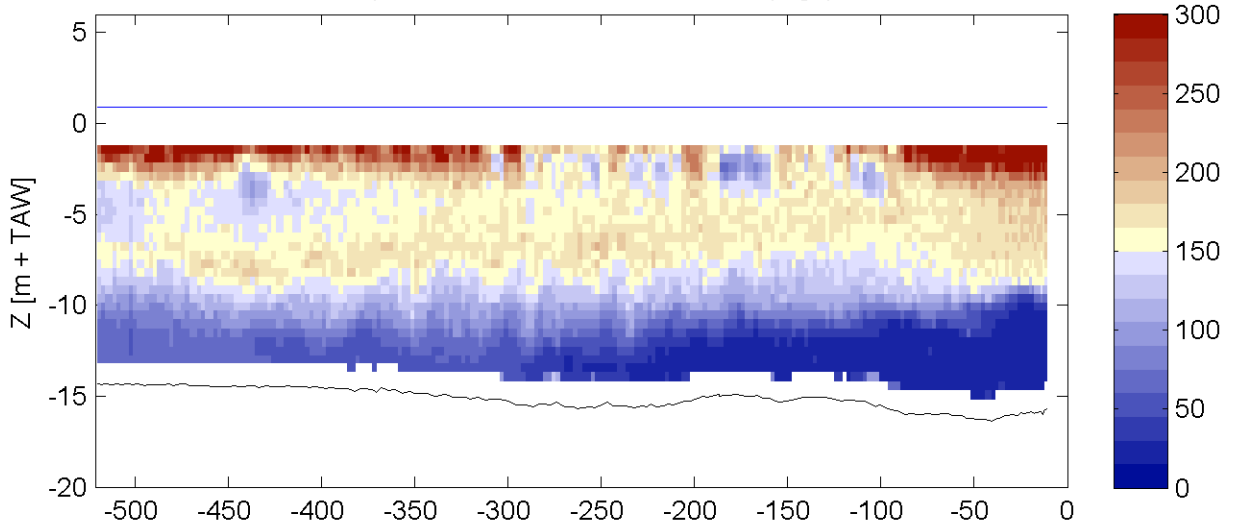
In association with : w.l | delft hydraulics, GEMS International

I/RA/11283/07.090/MSA

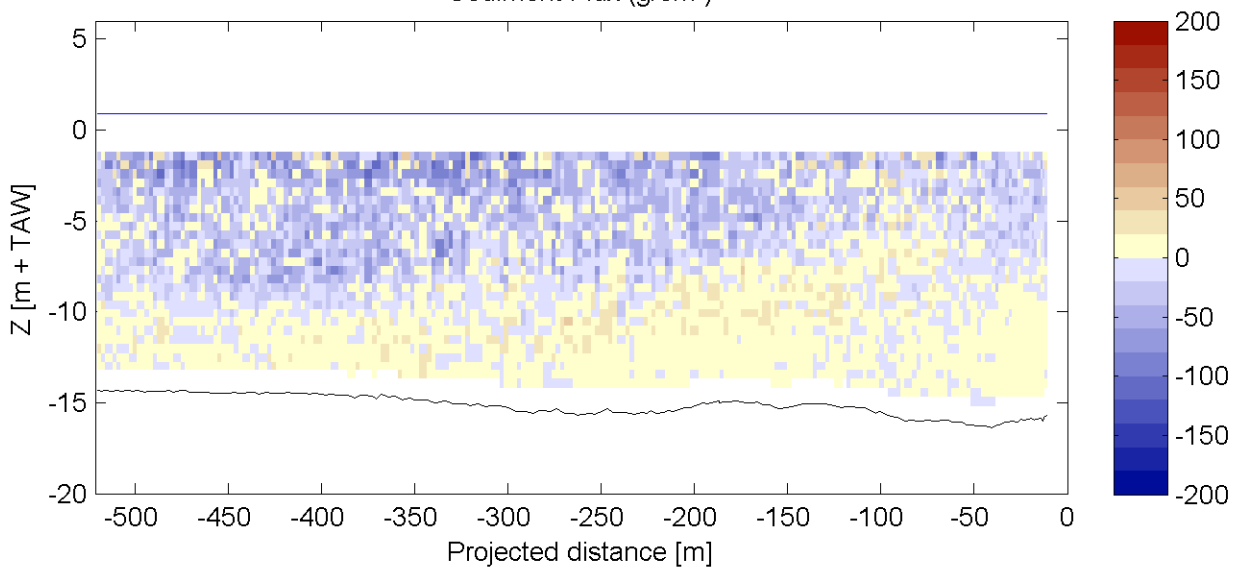
# Through Tide Sediview Measurement Spring tide 11/03/2008

| | |
|---|---|
| 11283 - Aanslibbing Deurganckdok | Equipment(s): ADCP |
| Sourcefile: 3055DGDt_sub.csv | Location: Transect DGD |

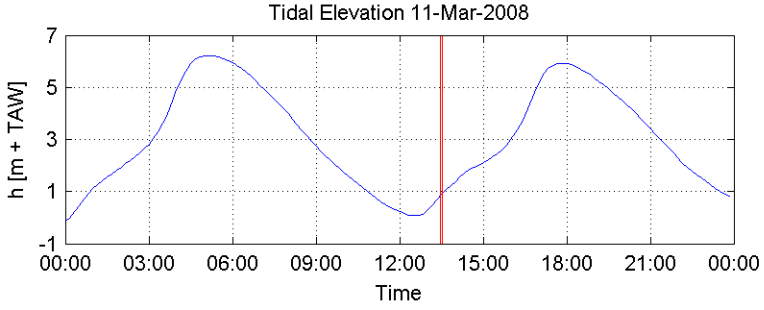
Suspended Sediment Concentration (mg/l)




Sediment Flux (g/sm²)




Tidal Elevation 11-Mar-2008




HW/LW:
05:00: h = 6.22 m+TAW
12:30: h = 0.08 m+TAW
17:50: h = 5.93 m+TAW

Date / Time [MET] :

11-Mar-2008

13:27 - 13:31

Time after HW [HH:MM]

-4:20

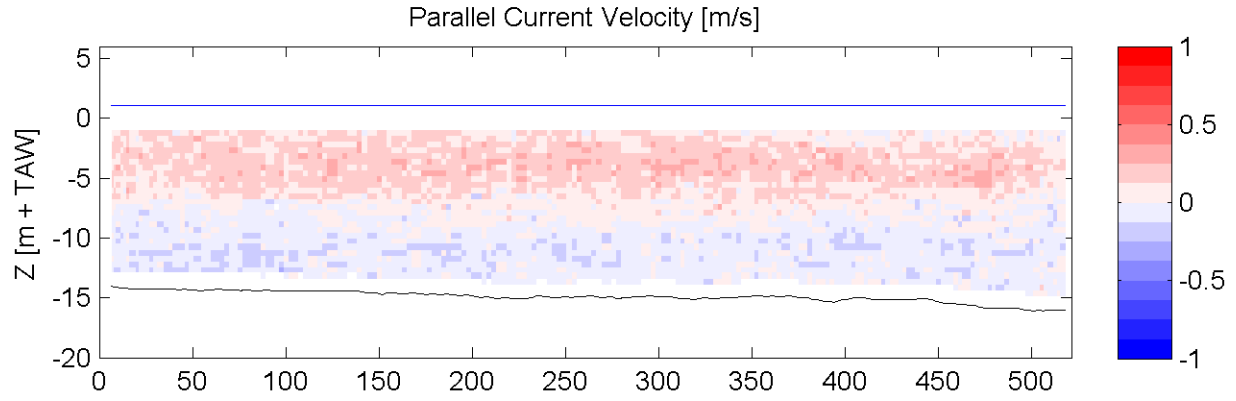
Data Processed by: IMDC

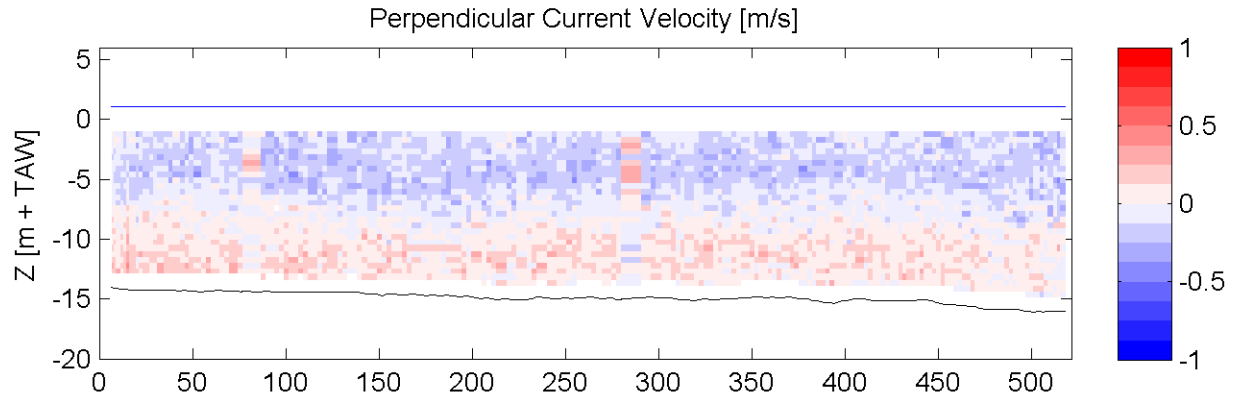
In association with : WL | delft hydraulics, GEMS International

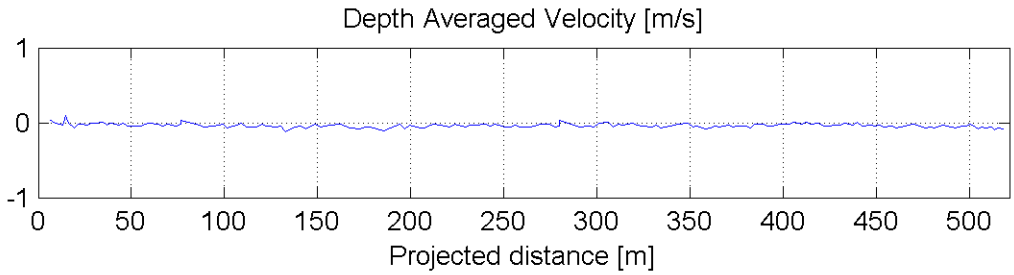
I/RA/11283/07.090/MSA

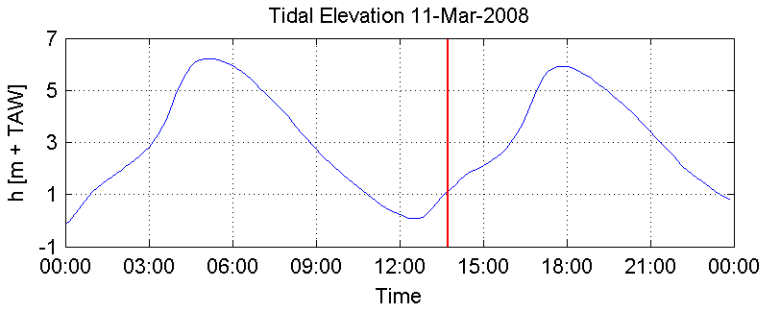
# Through Tide Sediview Measurement Spring tide 11/03/2008

| | |
|---|---|
| 11283 - Aanslibbing Deurganckdok | Equipment(s): ADCP |
| Sourcefile: 3057DGDs_sub.csv | Location: Transect DGD |




HW/LW: 05:00: h = 6.22 m+TAW
12:30: h = 0.08 m+TAW
17:50: h = 5.93 m+TAW

Date / Time [MET] :

11-Mar-2008

13:41 - 13:45

Time after HW [HH:MM]

-4:06

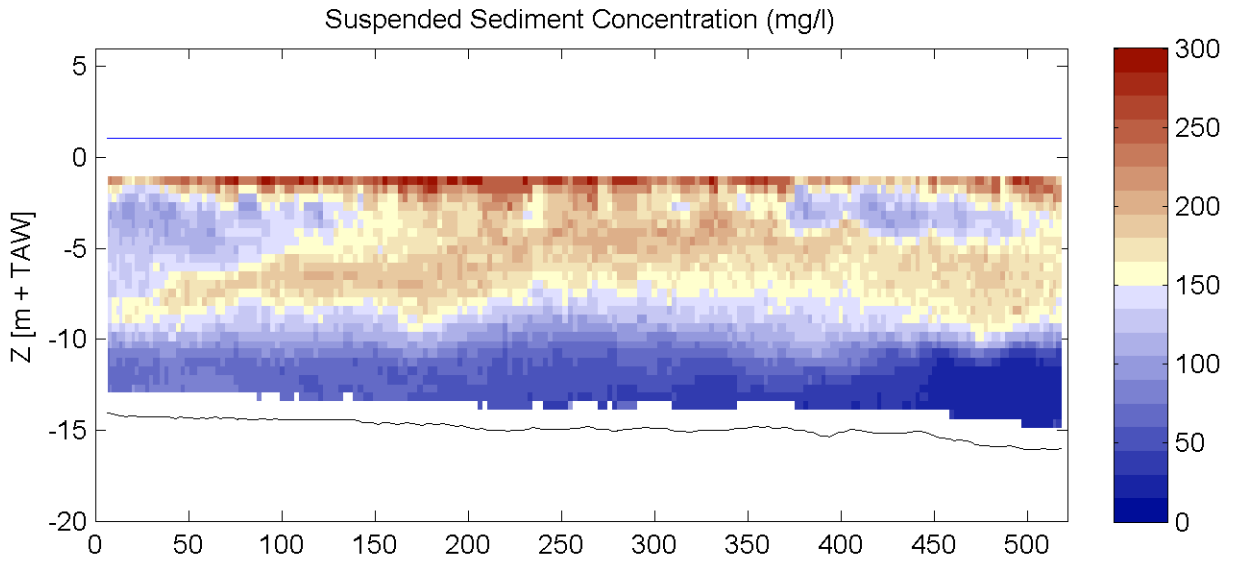
Data Processed by: IMDC

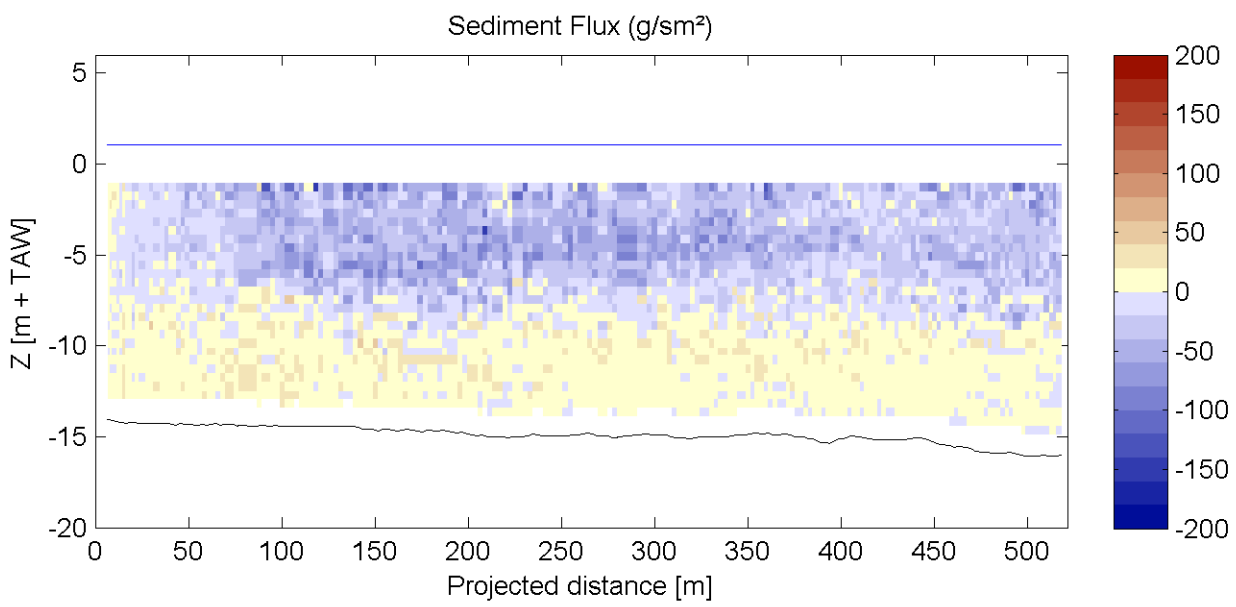
In association with : WL | delft hydraulics, GEMS International

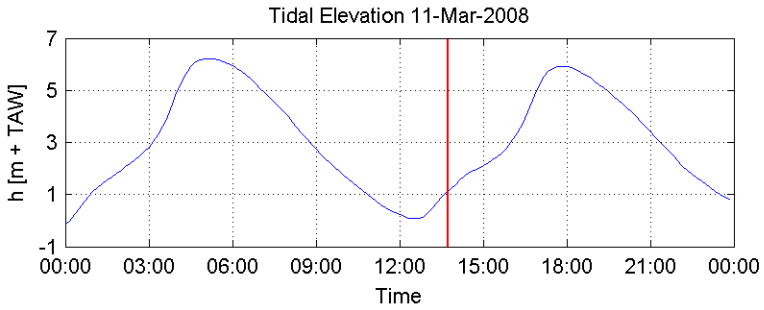
I/RA/11283/07.090/MSA

# Through Tide Sediview Measurement Spring tide 11/03/2008

| | |
|---|---|
| 11283 - Aanslibbing Deurganckdok | Equipment(s): ADCP |
| Sourcefile: 3057DGDs_sub.csv | Location: Transect DGD |




HW/LW:
05:00: h = 6.22 m+TAW
12:30: h = 0.08 m+TAW
17:50: h = 5.93 m+TAW

Date / Time [MET] :

11-Mar-2008

13:41 - 13:45

Time after HW [HH:MM]

-4:06

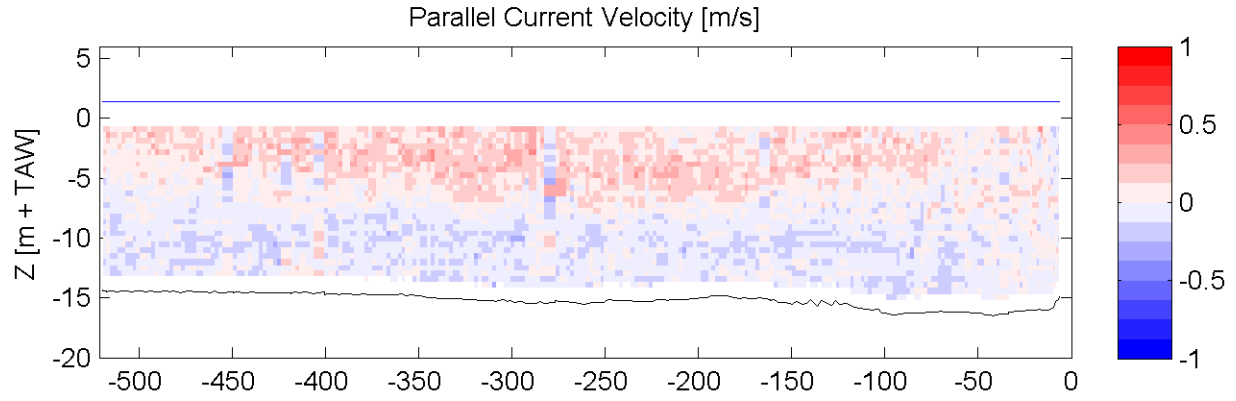
Data Processed by: IMDC

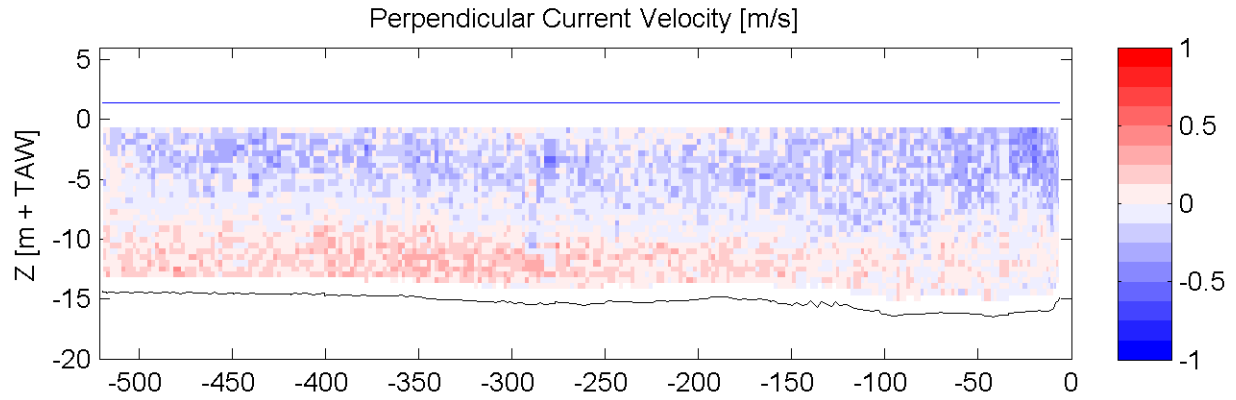
In association with : WL | delft hydraulics, GEMS International

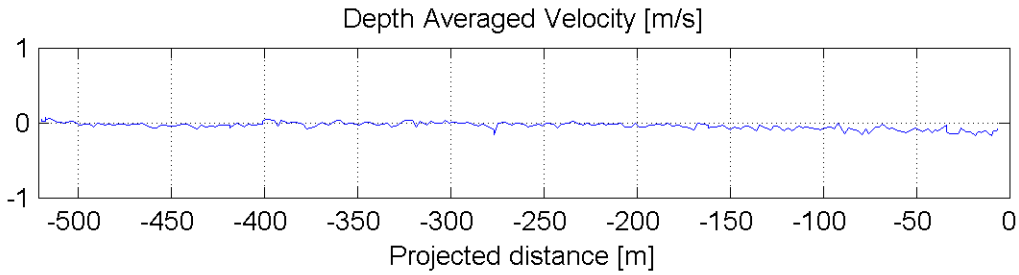
I/RA/11283/07.090/MSA

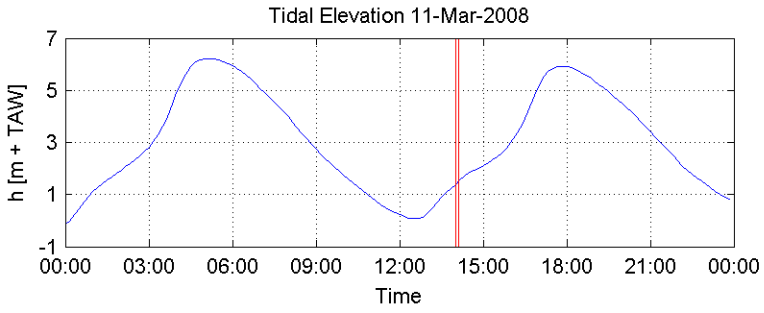
# Through Tide Sediview Measurement Spring tide 11/03/2008

| | |
|---|---|
| 11283 - Aanslibbing Deurganckdok | Equipment(s): ADCP |
| Sourcefile: 3059DGDt_sub.csv | Location: Transect DGD |




HW/LW:
05:00: h = 6.22 m+TAW
12:30: h = 0.08 m+TAW
17:50: h = 5.93 m+TAW

Date / Time [MET] :

11-Mar-2008

14:01 - 14:06

Time after HW [HH:MM]

-3:45

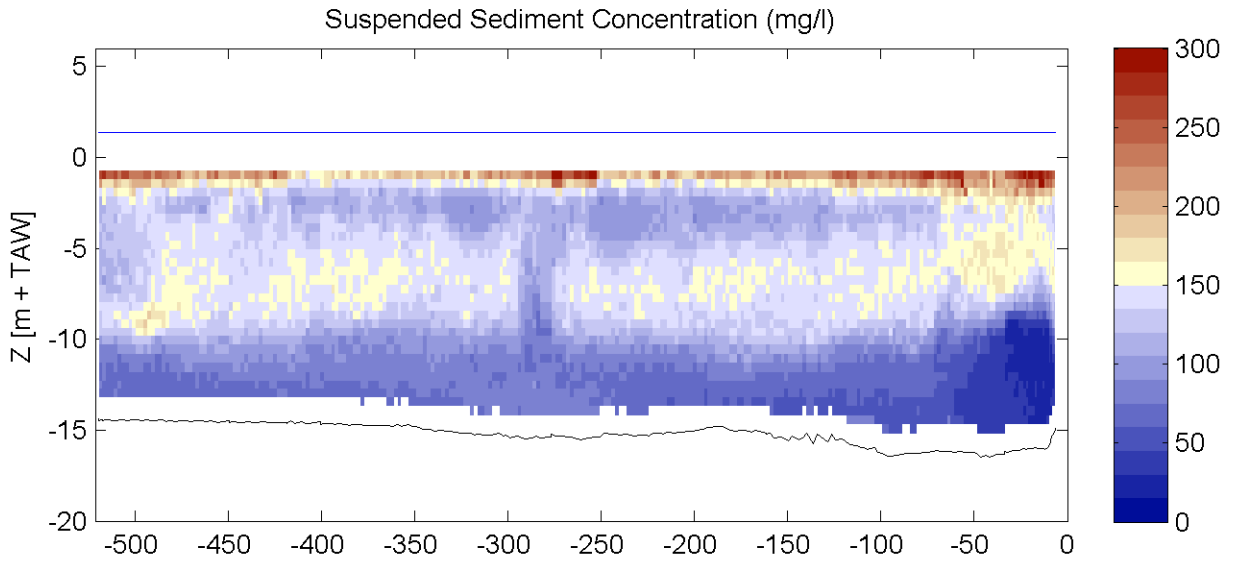
Data Processed by: IMDC

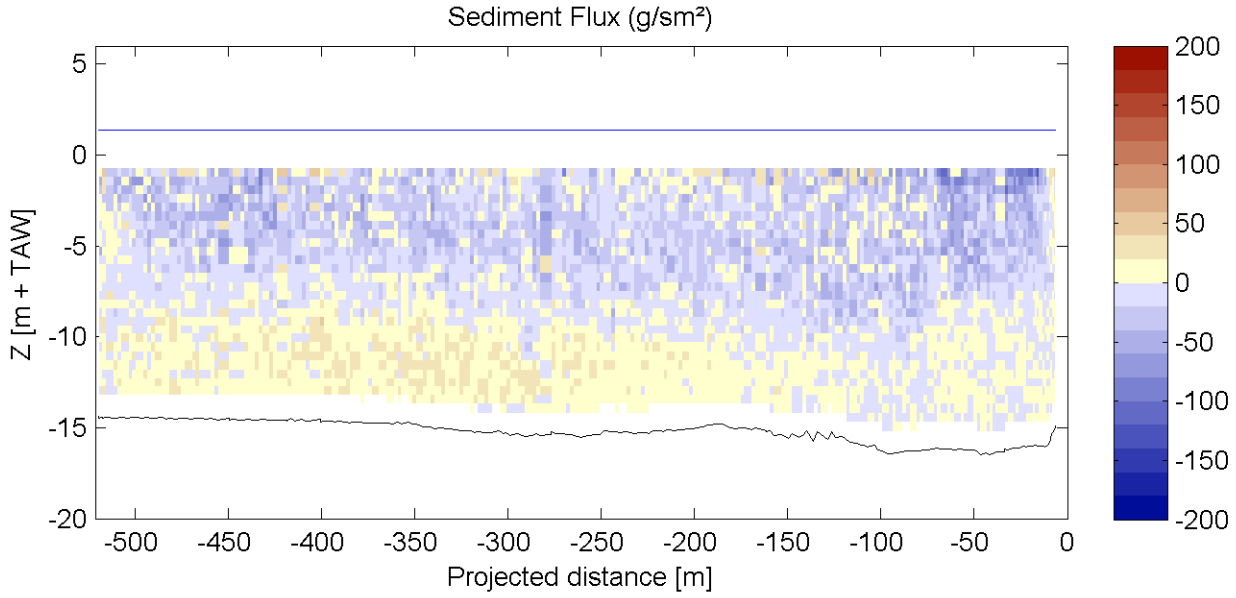
In association with : WL | delft hydraulics, GEMS International

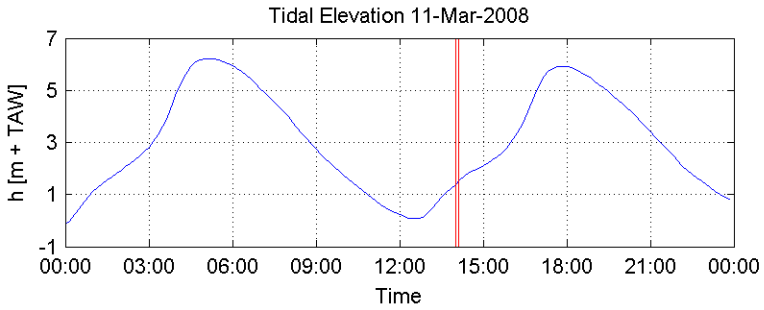
I/RA/11283/07.090/MSA

# Through Tide Sediview Measurement Spring tide 11/03/2008

| | |
|---|---|
| 11283 - Aanslibbing Deurganckdok | Equipment(s): ADCP |
| Sourcefile: 3059DGDt_sub.csv | Location: Transect DGD |




HW/LW:
05:00: h = 6.22 m+TAW
12:30: h = 0.08 m+TAW
17:50: h = 5.93 m+TAW

Date / Time [MET] :

11-Mar-2008

14:01 - 14:06

Time after HW [HH:MM]

-3:45

Data Processed by: IMDC

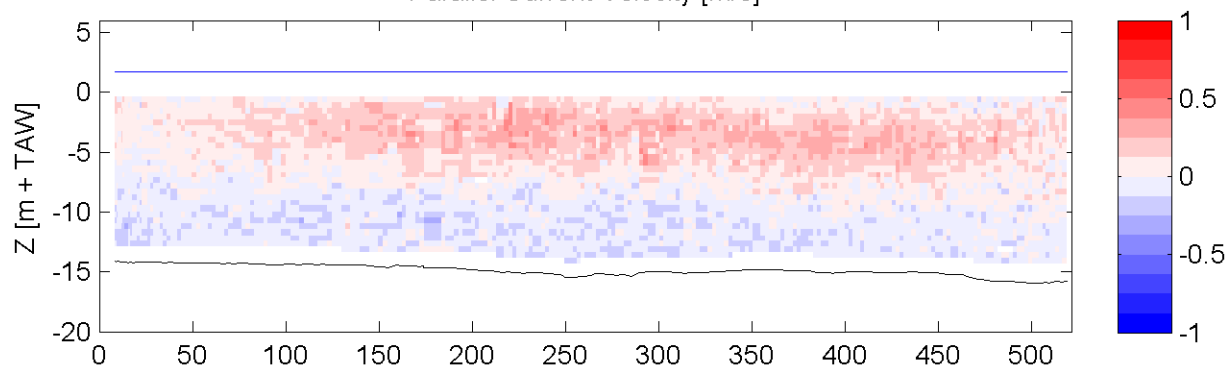
In association with : WL | delft hydraulics, GEMS International

I/RA/11283/07.090/MSA

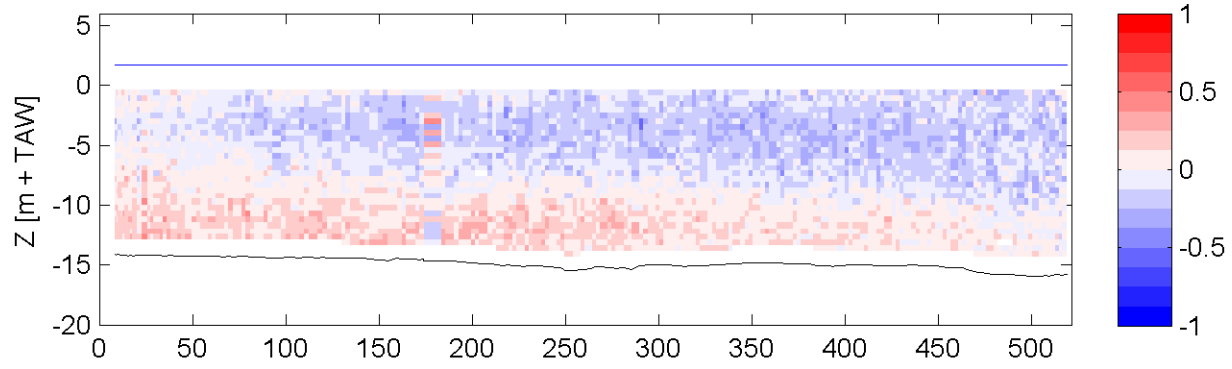
# Through Tide Sediview Measurement Spring tide 11/03/2008

| | |
|---|---|
| 11283 - Aanslibbing Deurganckdok | Equipment(s): ADCP |
| Sourcefile: 3061DGDs_sub.csv | Location: Transect DGD |

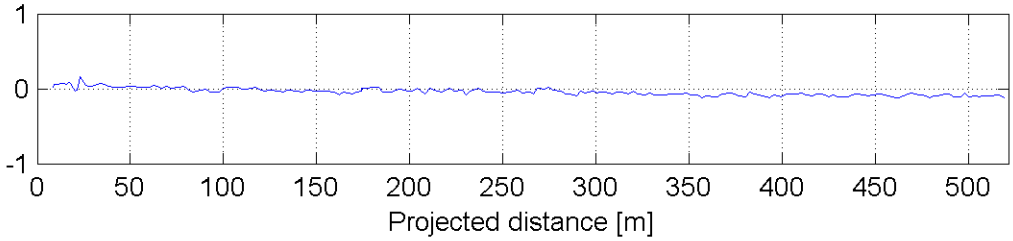
Parallel Current Velocity [m/s]



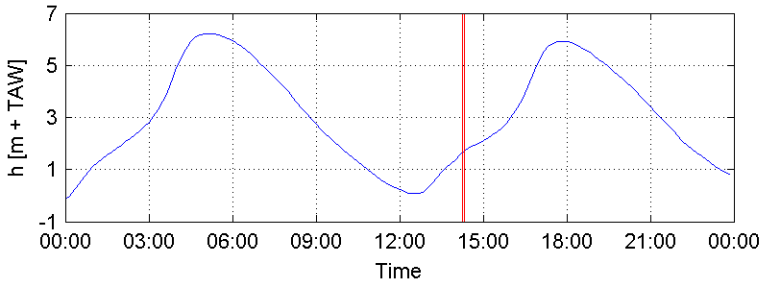

Perpendicular Current Velocity [m/s]




Depth Averaged Velocity [m/s]




Tidal Elevation 11-Mar-2008




HW/LW:
05:00: h = 6.22 m+TAW
12:30: h = 0.08 m+TAW
17:50: h = 5.93 m+TAW

Date / Time [MET] :

11-Mar-2008

14:15 - 14:19

Time after HW [HH:MM]

-3:32

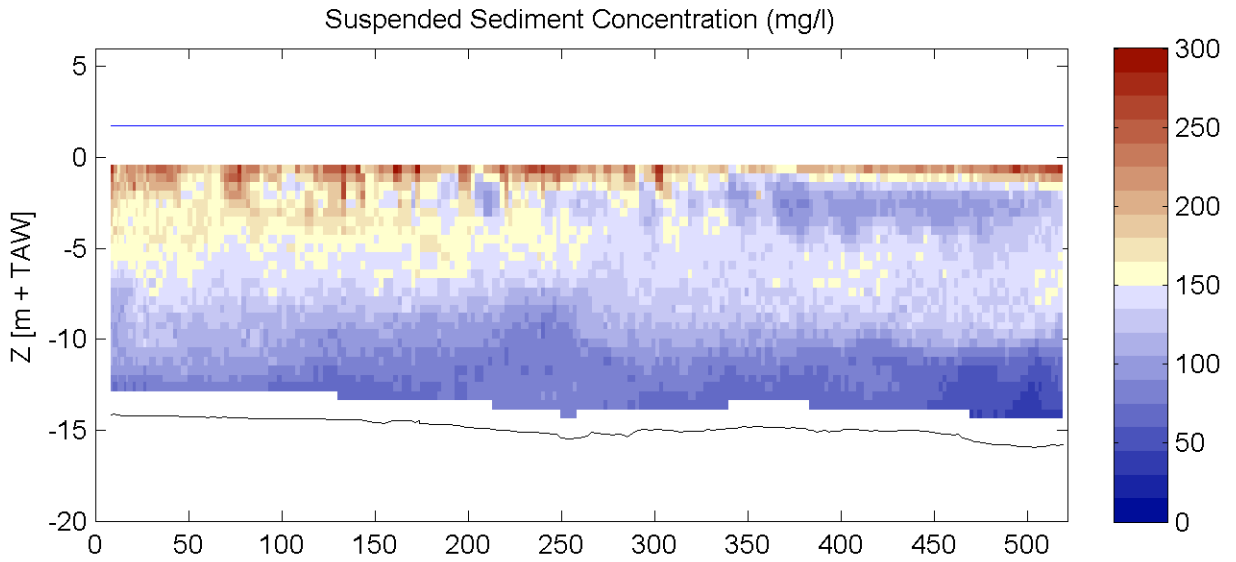
Data Processed by: IMDC

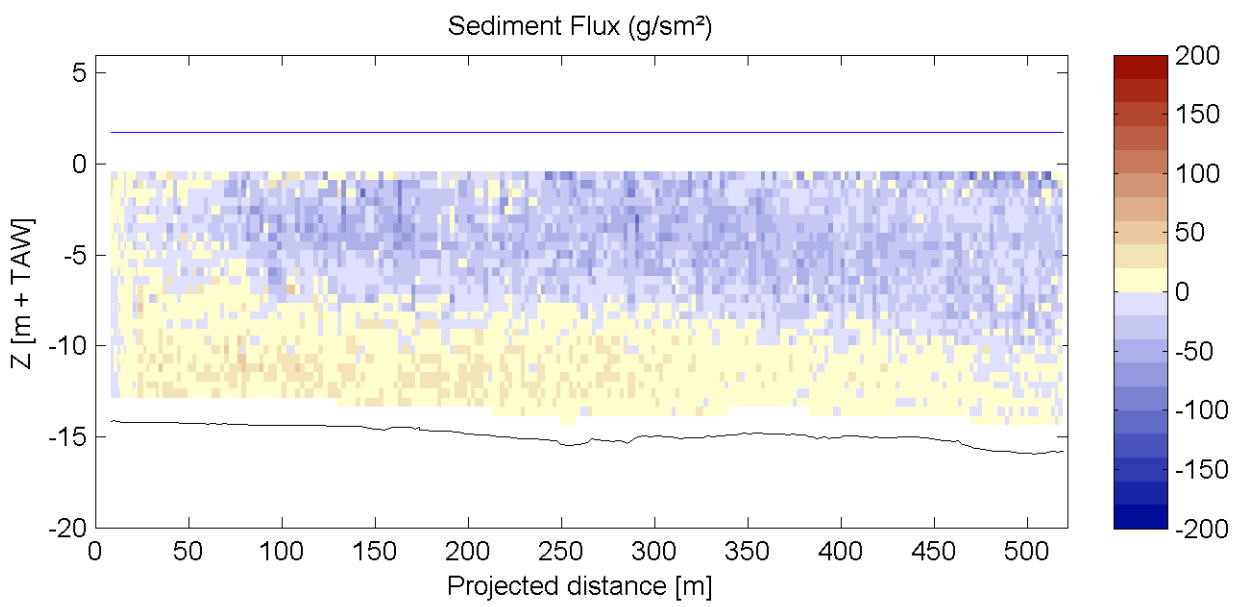
In association with : w.l | delft hydraulics, GEMS International

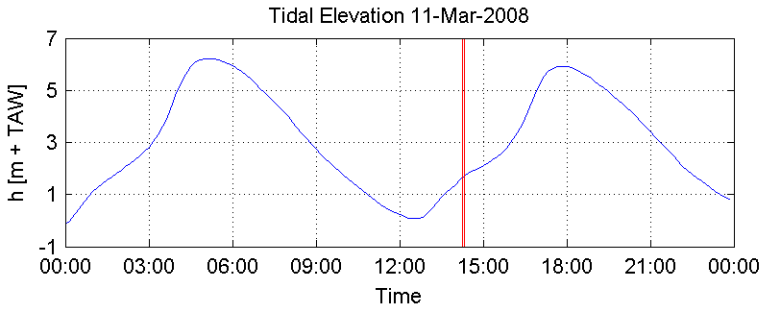
I/RA/11283/07.090/MSA

# Through Tide Sediview Measurement Spring tide 11/03/2008

| | |
|---|---|
| 11283 - Aanslibbing Deurganckdok | Equipment(s): ADCP |
| Sourcefile: 3061DGDs_sub.csv | Location: Transect DGD |




HW/LW:
05:00: h = 6.22 m+TAW
12:30: h = 0.08 m+TAW
17:50: h = 5.93 m+TAW

Date / Time [MET] :

11-Mar-2008

14:15 - 14:19

Time after HW [HH:MM]

-3:32

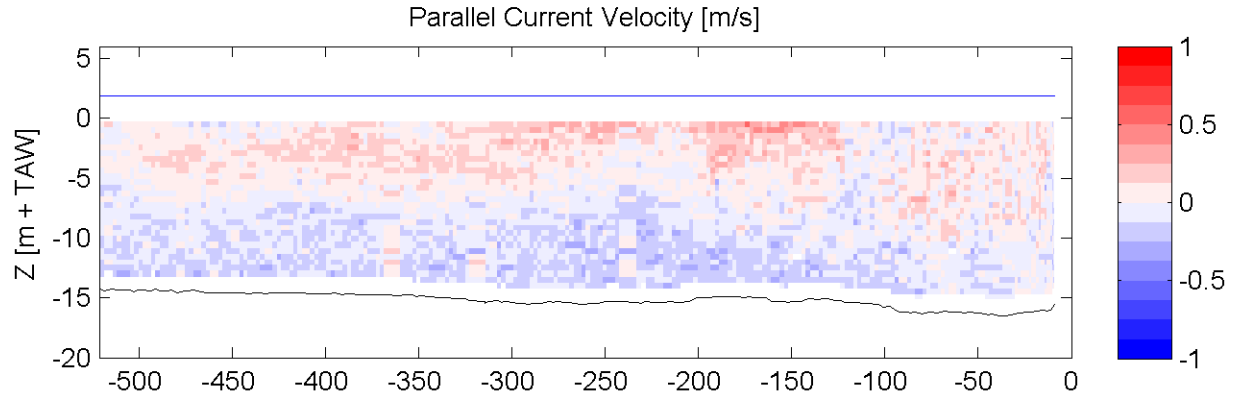
Data Processed by: IMDC

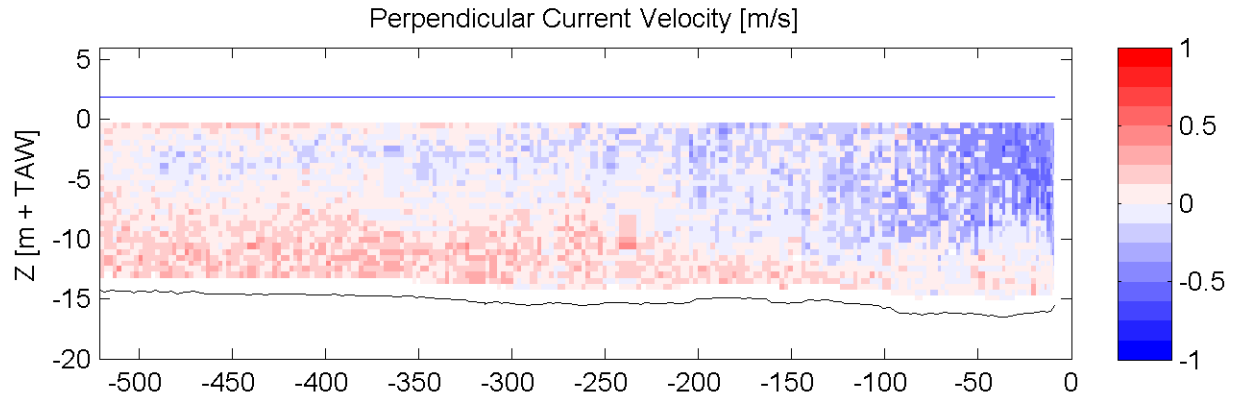
In association with : WL | delft hydraulics, GEMS International

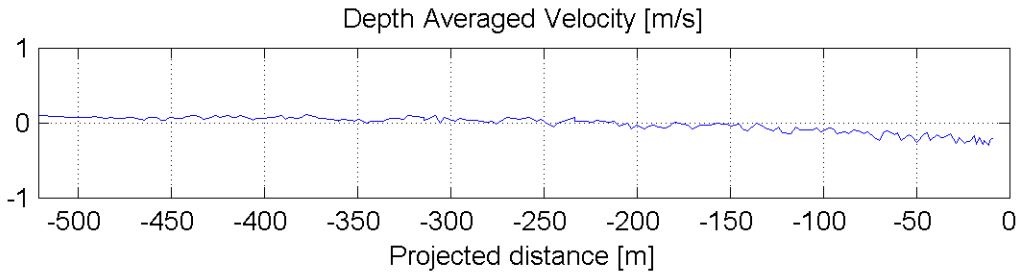
I/RA/11283/07.090/MSA

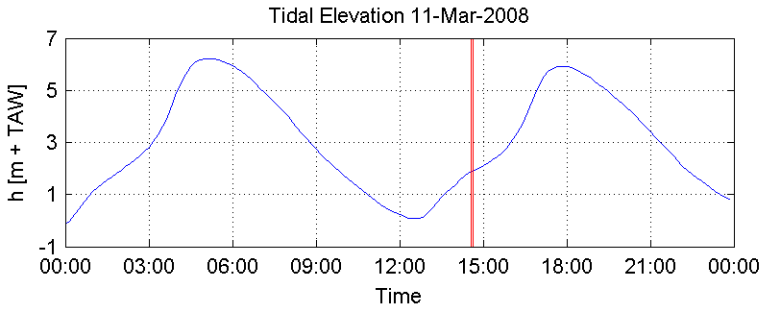
# Through Tide Sediview Measurement Spring tide 11/03/2008

| | |
|---|---|
| 11283 - Aanslibbing Deurganckdok | Equipment(s): ADCP |
| Sourcefile: 3063DGDt_sub.csv | Location: Transect DGD |




HW/LW: 05:00: h = 6.22 m+TAW
12:30: h = 0.08 m+TAW
17:50: h = 5.93 m+TAW

Date / Time [MET] :

11-Mar-2008

14:33 - 14:37

Time after HW [HH:MM]

-3:14

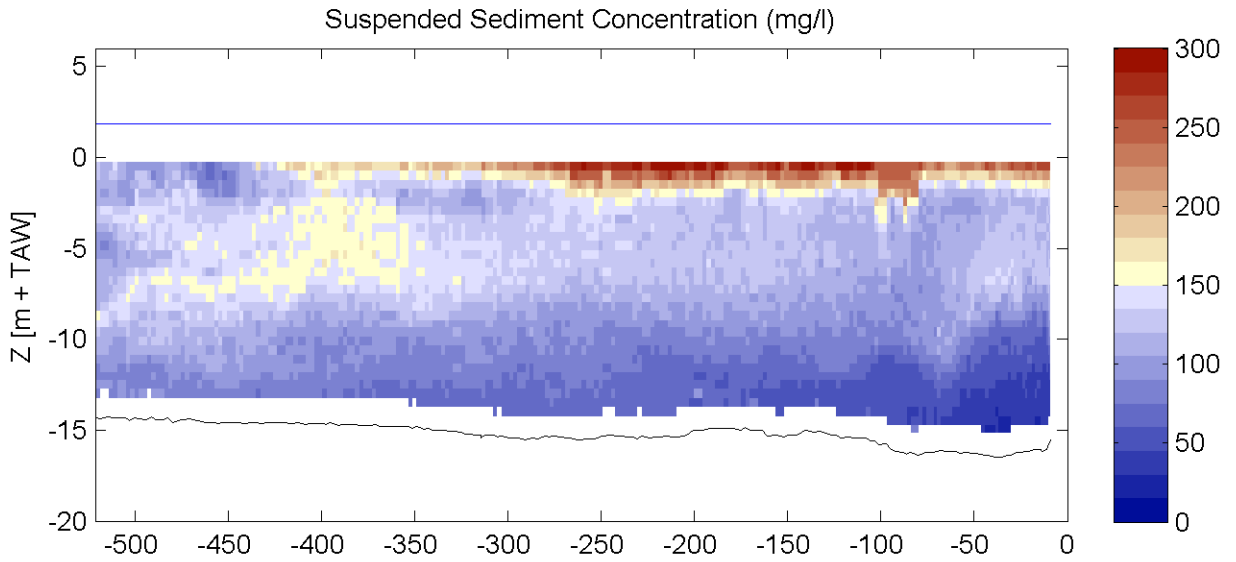
Data Processed by: IMDC

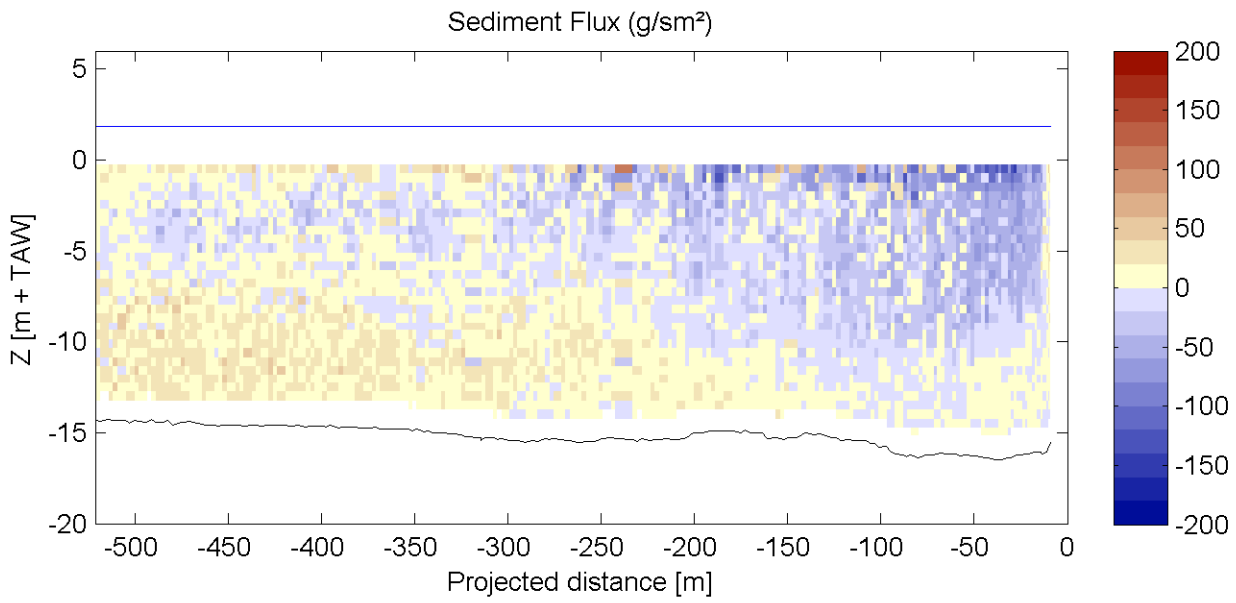
In association with : w.l | delft hydraulics, GEMS International

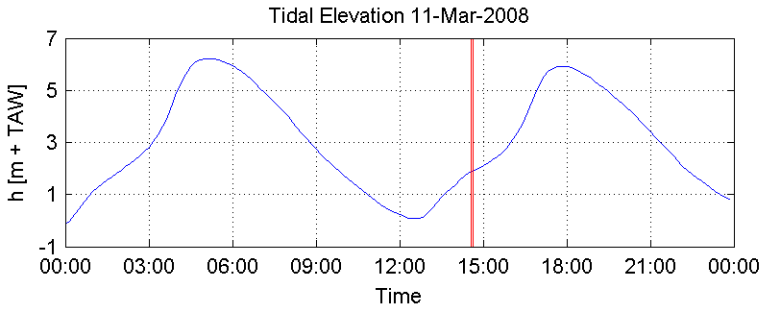
I/RA/11283/07.090/MSA

# Through Tide Sediview Measurement Spring tide 11/03/2008

| | |
|---|---|
| 11283 - Aanslibbing Deurganckdok | Equipment(s): ADCP |
| Sourcefile: 3063DGDt_sub.csv | Location: Transect DGD |




HW/LW:
05:00: h = 6.22 m+TAW
12:30: h = 0.08 m+TAW
17:50: h = 5.93 m+TAW

Date / Time [MET] :

11-Mar-2008

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-3:14

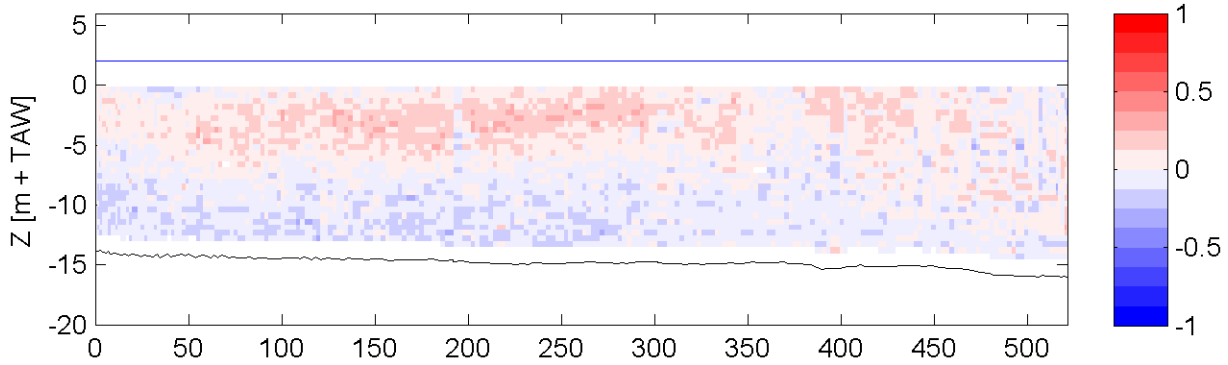
Data Processed by: IMDC

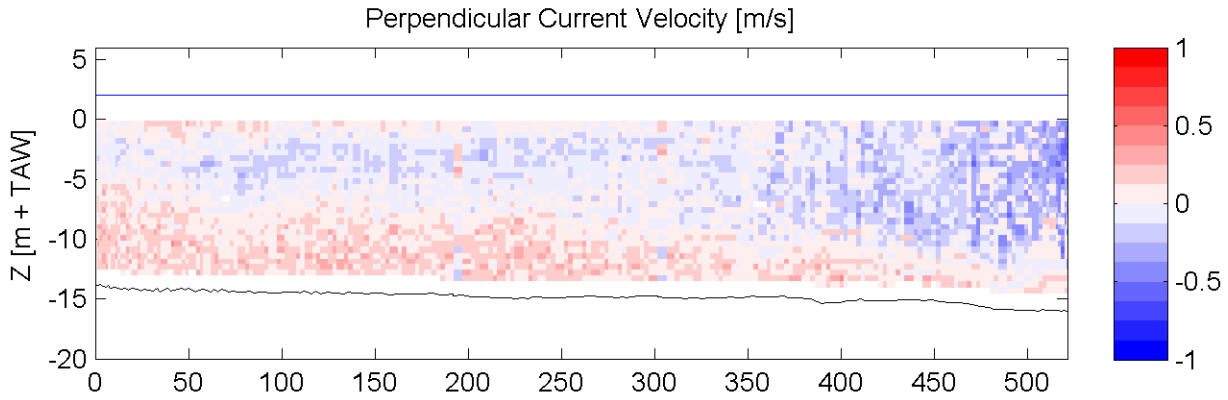
In association with : WL | delft hydraulics, GEMS International

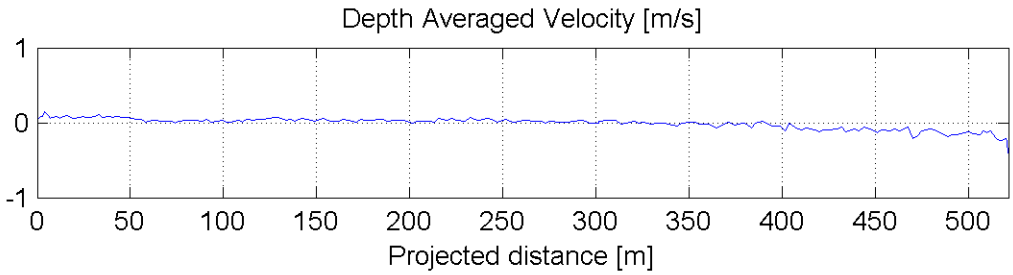
I/RA/11283/07.090/MSA

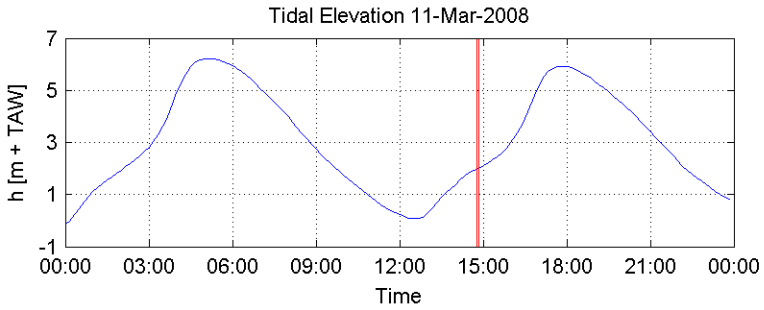
# Through Tide Sediview Measurement Spring tide 11/03/2008

| | |
|---|---|
| 11283 - Aanslibbing Deurganckdok | Equipment(s): ADCP |
| Sourcefile: 3065DGDt_sub.csv | Location: Transect DGD |




HW/LW: 05:00: h = 6.22 m+TAW
12:30: h = 0.08 m+TAW
17:50: h = 5.93 m+TAW

Date / Time [MET] :

11-Mar-2008

14:46 - 14:50

Time after HW [HH:MM]

-3:01

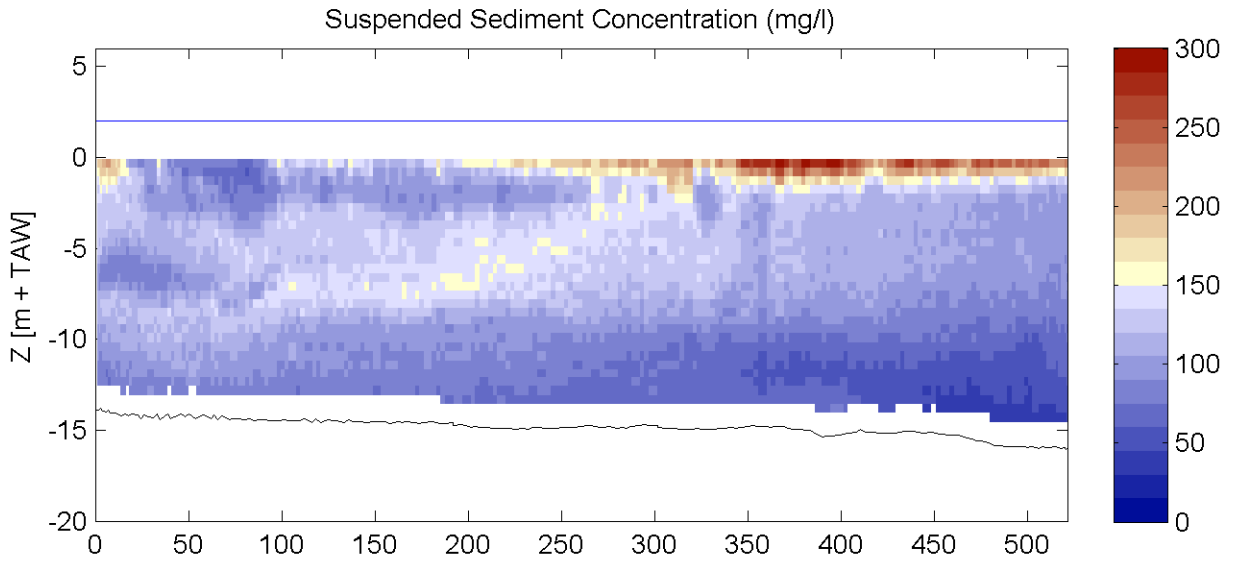
Data Processed by: IMDC

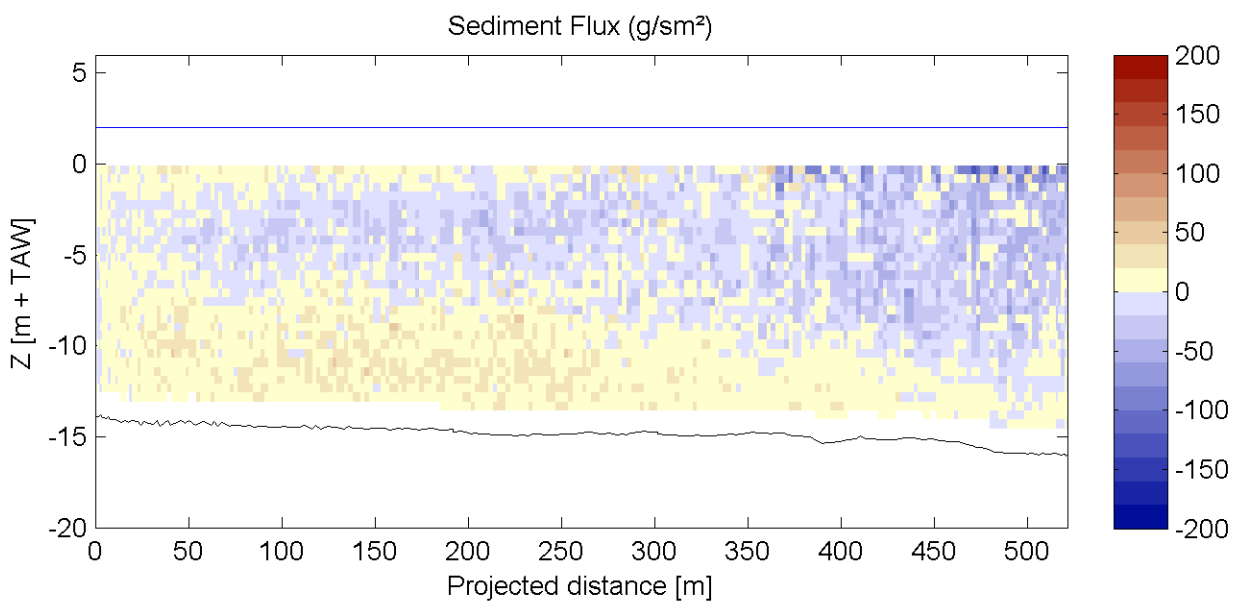
In association with : w.l | delft hydraulics, GEMS International

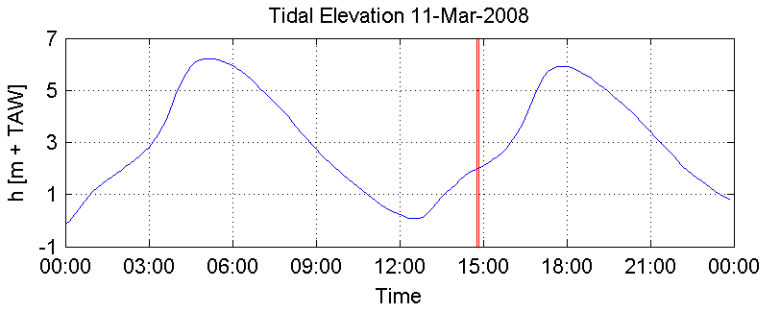
I/RA/11283/07.090/MSA

# Through Tide Sediview Measurement Spring tide 11/03/2008

| | |
|---|---|
| 11283 - Aanslibbing Deurganckdok | Equipment(s): ADCP |
| Sourcefile: 3065DGDt_sub.csv | Location: Transect DGD |




HW/LW:
05:00: h = 6.22 m+TAW
12:30: h = 0.08 m+TAW
17:50: h = 5.93 m+TAW

Date / Time [MET] :

11-Mar-2008

14:46 - 14:50

Time after HW [HH:MM]

-3:01

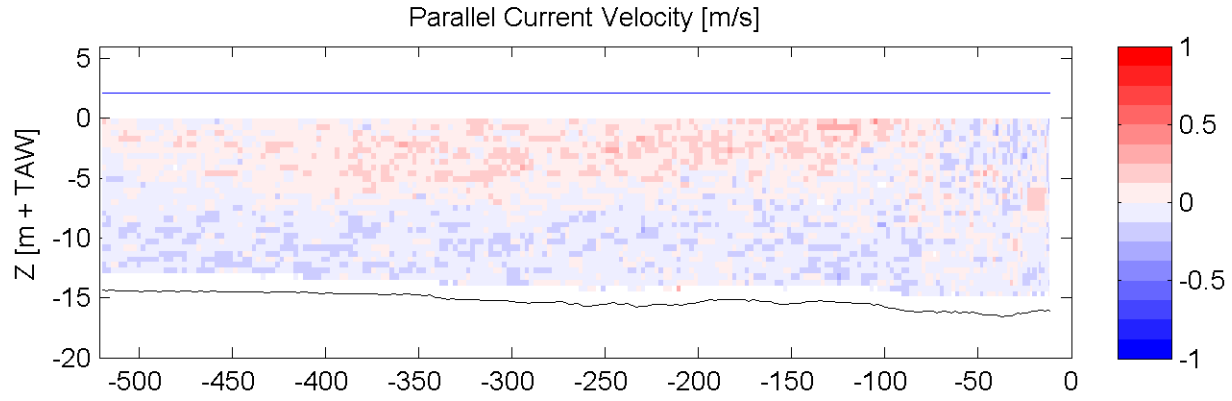
Data Processed by: IMDC

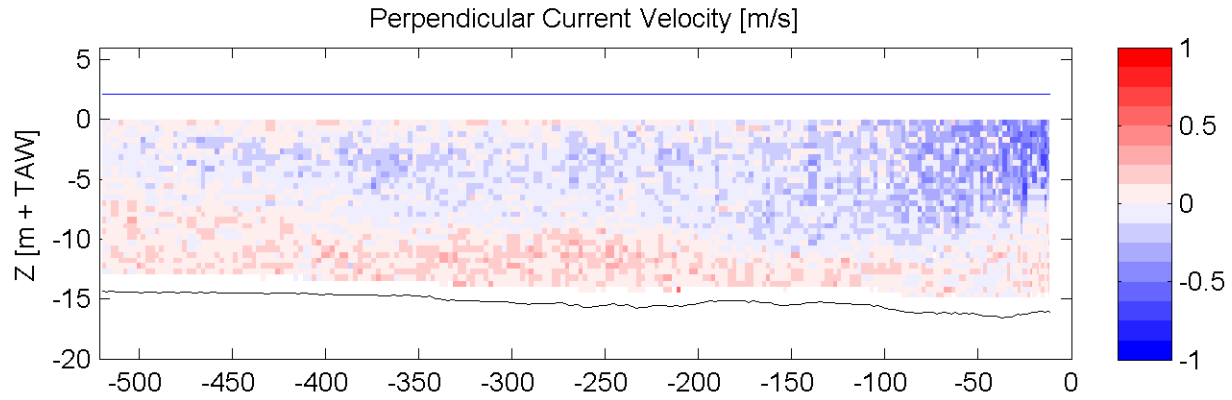
In association with : w.l | delft hydraulics, GEMS International

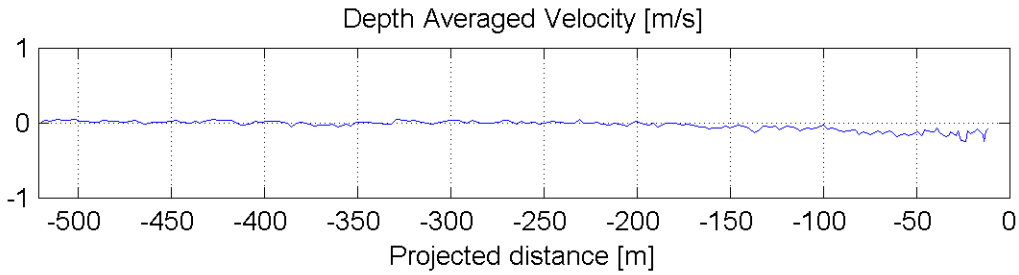
I/RA/11283/07.090/MSA

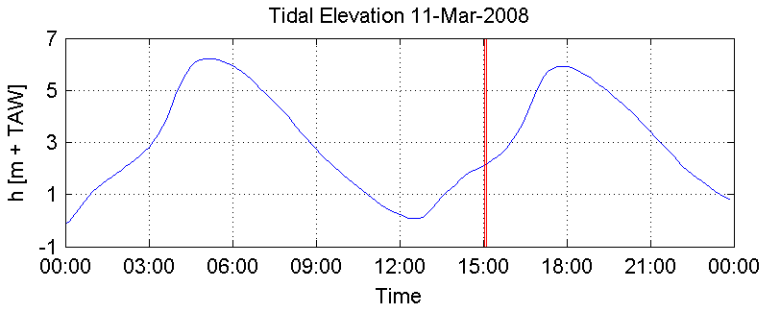
# Through Tide Sediview Measurement Spring tide 11/03/2008

| | |
|---|---|
| 11283 - Aanslibbing Deurganckdok | Equipment(s): ADCP |
| Sourcefile: 3067DGDt_sub.csv | Location: Transect DGD |




HW/LW:
05:00: h = 6.22 m+TAW
12:30: h = 0.08 m+TAW
17:50: h = 5.93 m+TAW

Date / Time [MET] :

11-Mar-2008

15:02 - 15:06

Time after HW [HH:MM]

-2:45

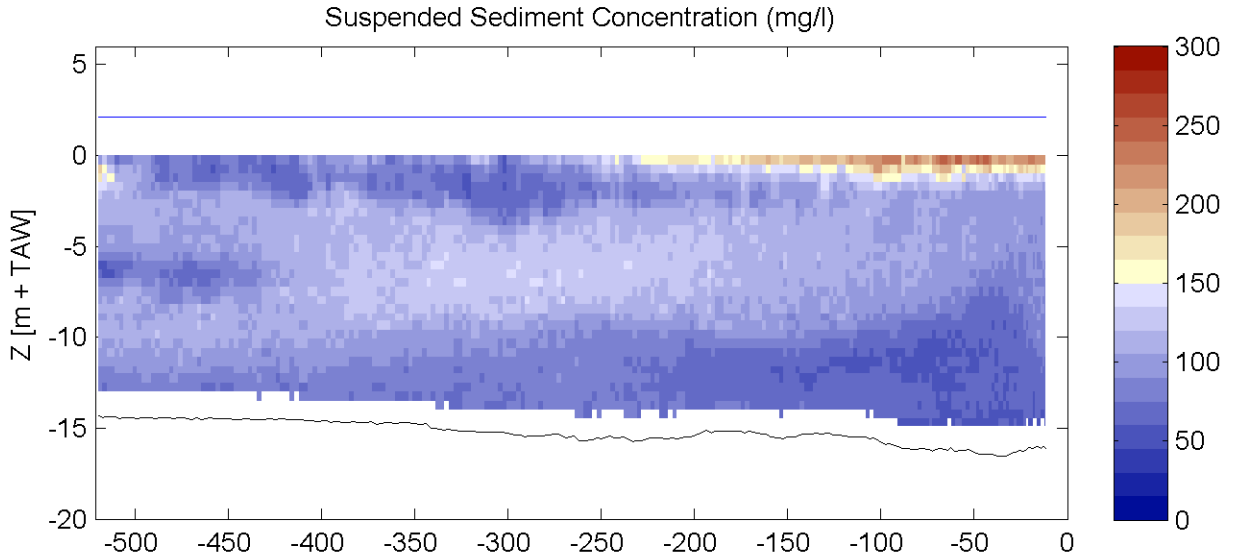
Data Processed by: IMDC

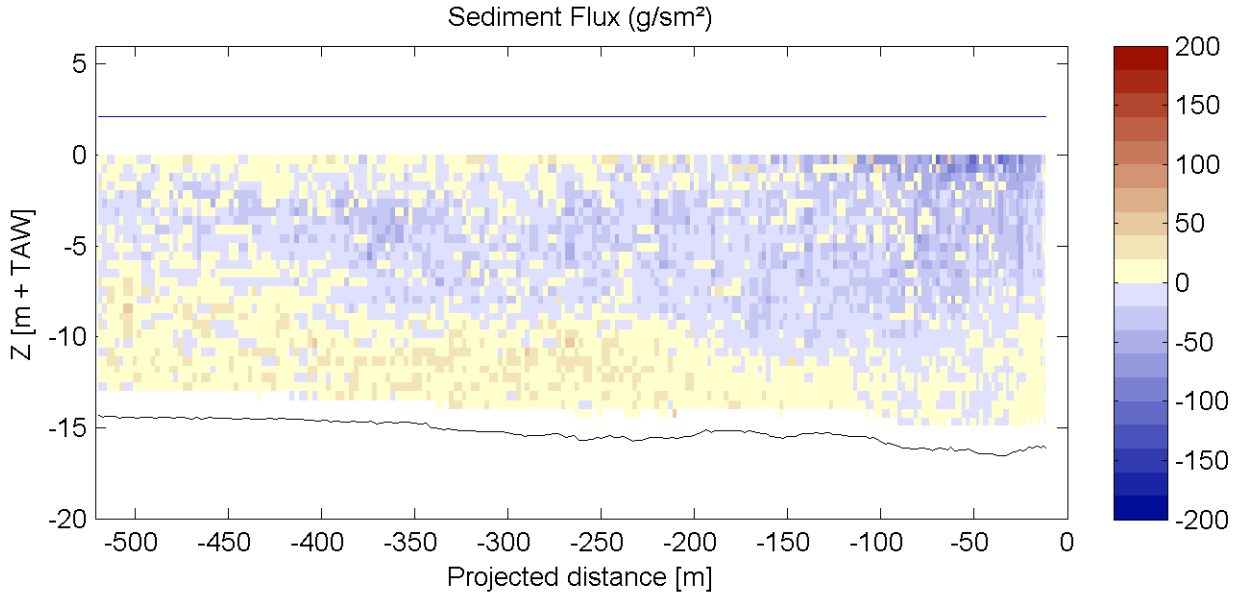
In association with : w.l | delft hydraulics, GEMS International

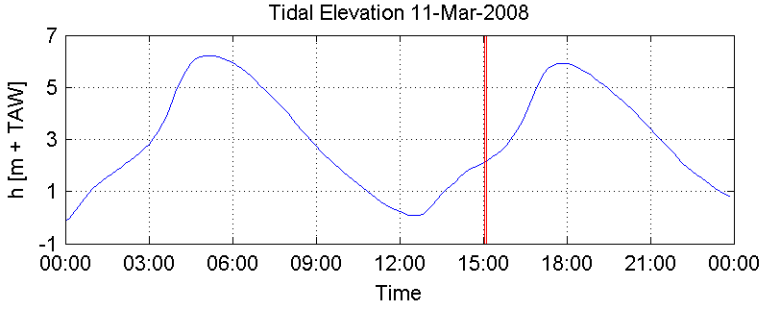
I/RA/11283/07.090/MSA

# Through Tide Sediview Measurement Spring tide 11/03/2008

| | |
|---|---|
| 11283 - Aanslibbing Deurganckdok | Equipment(s): ADCP |
| Sourcefile: 3067DGDt_sub.csv | Location: Transect DGD |




HW/LW:
05:00: h = 6.22 m+TAW
12:30: h = 0.08 m+TAW
17:50: h = 5.93 m+TAW

Date / Time [MET] :

11-Mar-2008

15:02 - 15:06

Time after HW [HH:MM]

-2:45

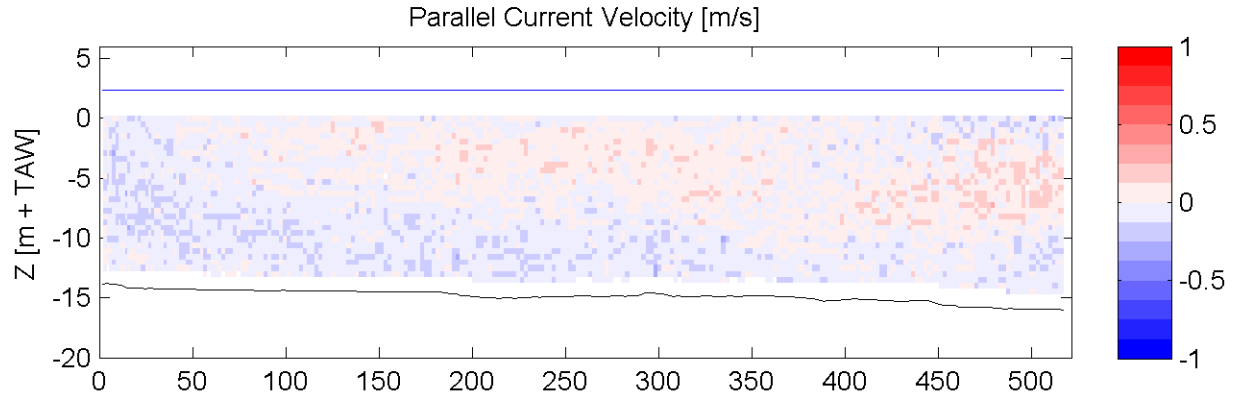
Data Processed by: IMDC

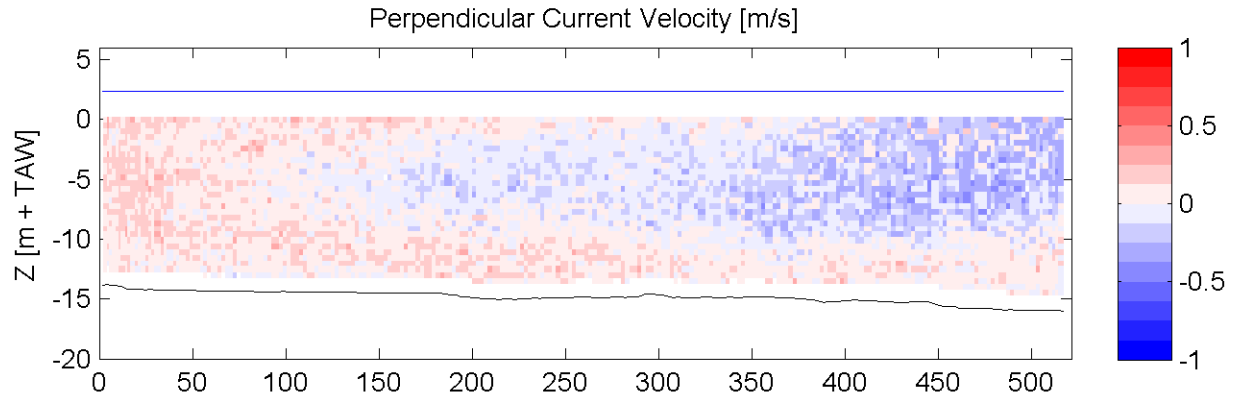
In association with : WL | delft hydraulics, GEMS International

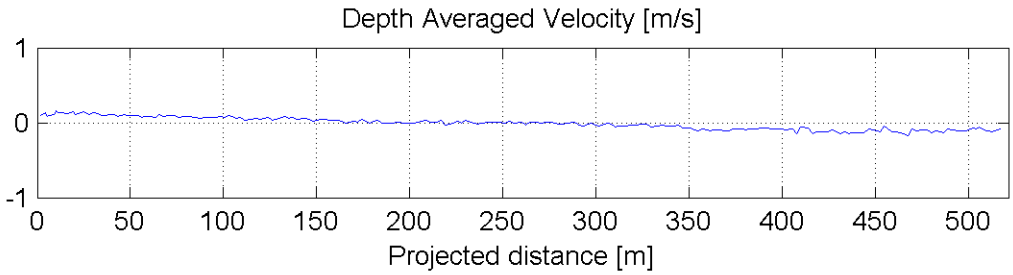
I/RA/11283/07.090/MSA

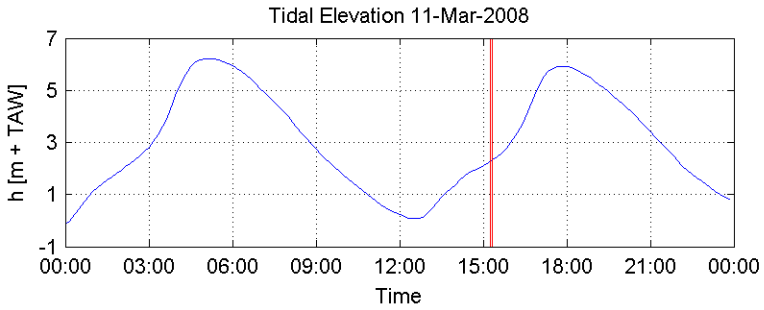
# Through Tide Sediview Measurement Spring tide 11/03/2008

| | |
|---|---|
| 11283 - Aanslibbing Deurganckdok | Equipment(s): ADCP |
| Sourcefile: 3069DGDs_sub.csv | Location: Transect DGD |




HW/LW: 05:00: h = 6.22 m+TAW
12:30: h = 0.08 m+TAW
17:50: h = 5.93 m+TAW

Date / Time [MET] :

11-Mar-2008

15:15 - 15:19

Time after HW [HH:MM]

-2:32

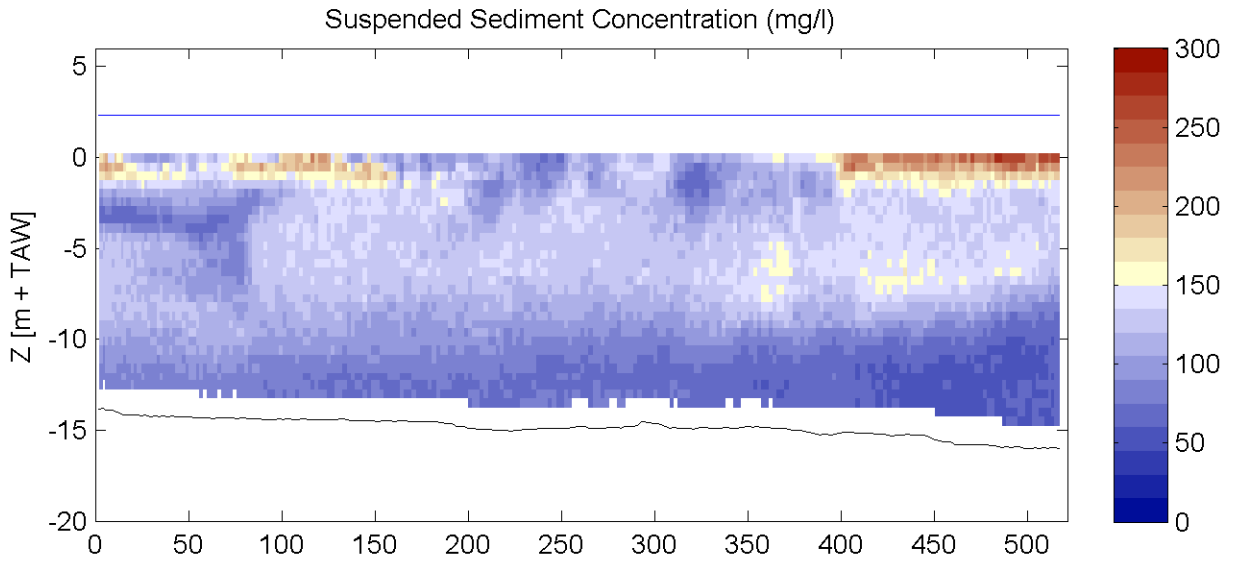
Data Processed by: IMDC

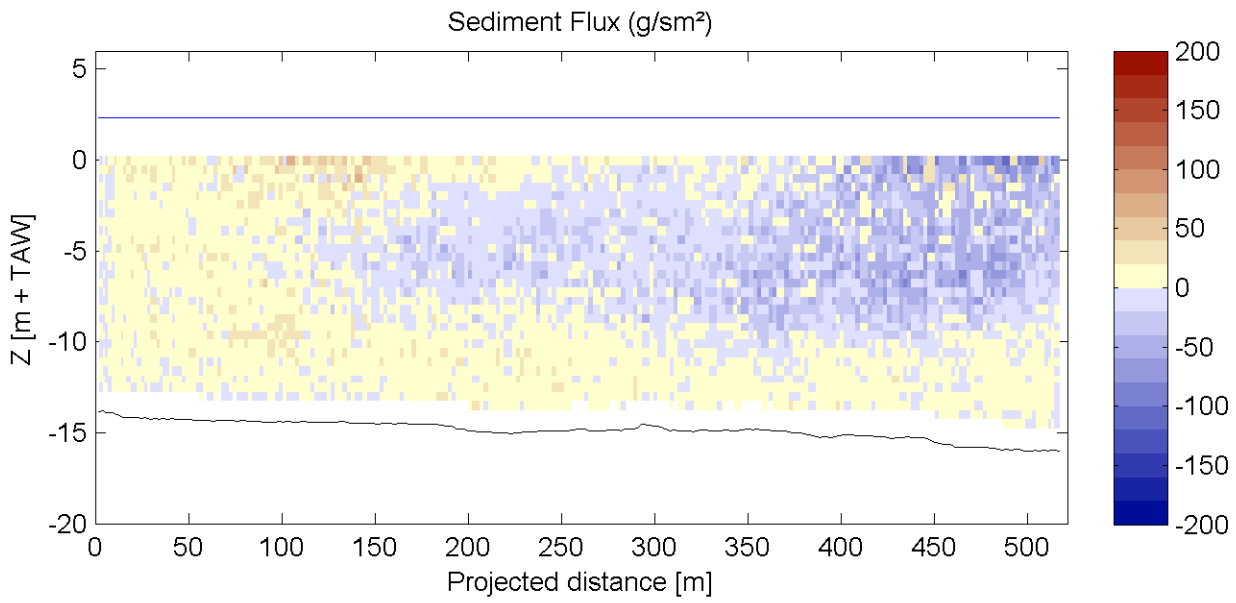
In association with : w.l | delft hydraulics, GEMS International

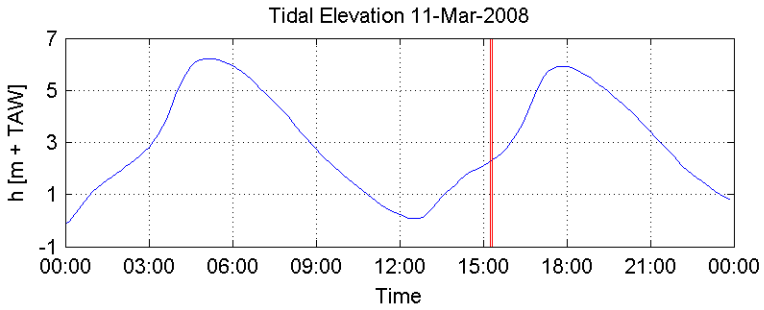
I/RA/11283/07.090/MSA

# Through Tide Sediview Measurement Spring tide 11/03/2008

| | |
|---|---|
| 11283 - Aanslibbing Deurganckdok | Equipment(s): ADCP |
| Sourcefile: 3069DGDs_sub.csv | Location: Transect DGD |




HW/LW:
05:00: h = 6.22 m+TAW
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-2:32

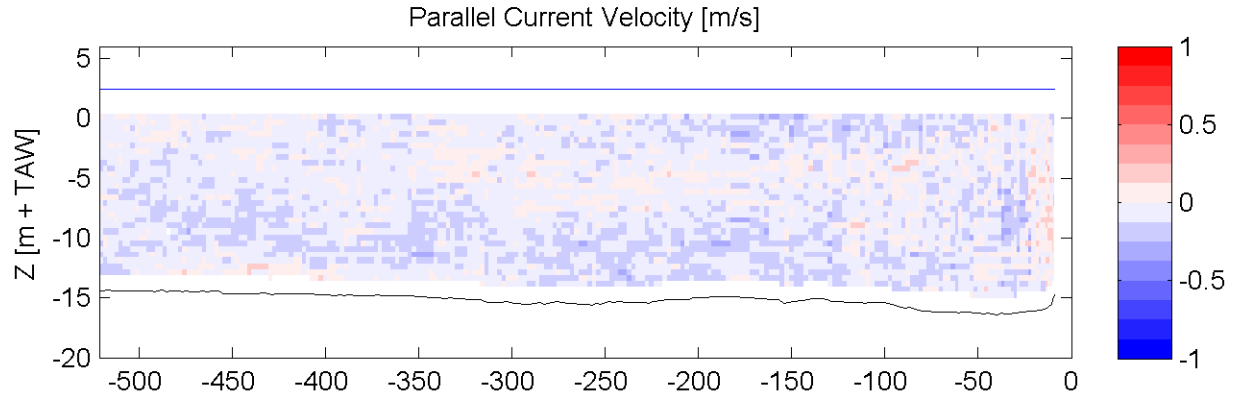
Data Processed by: IMDC

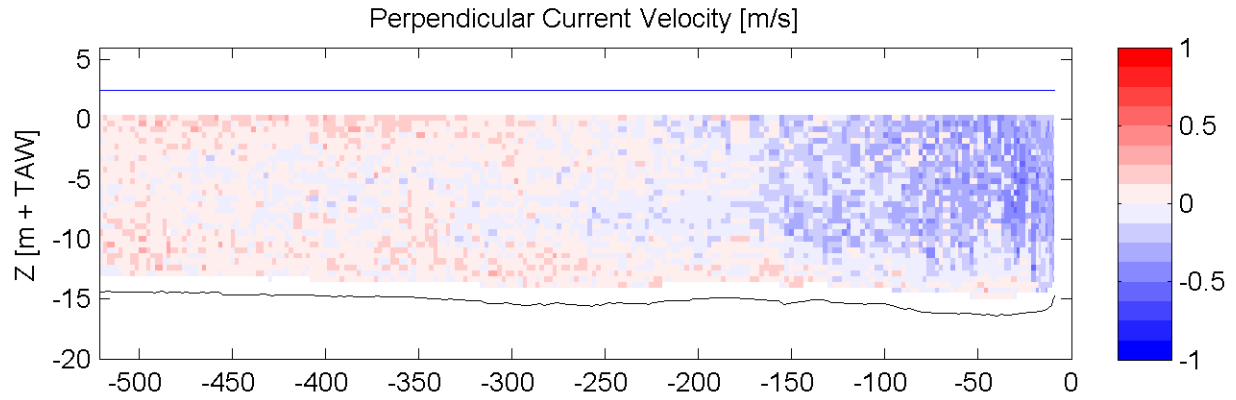
In association with : WL | delft hydraulics, GEMS International

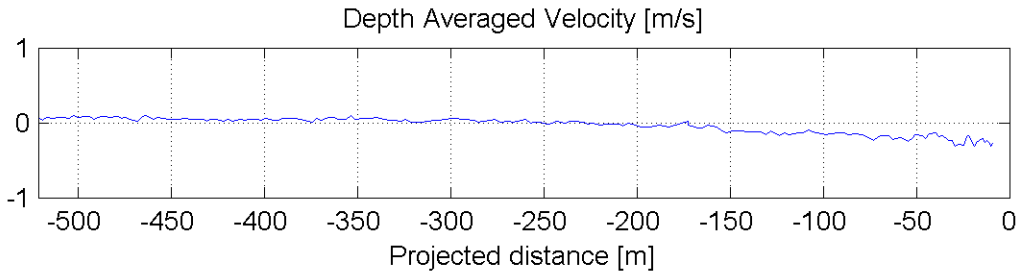
I/RA/11283/07.090/MSA

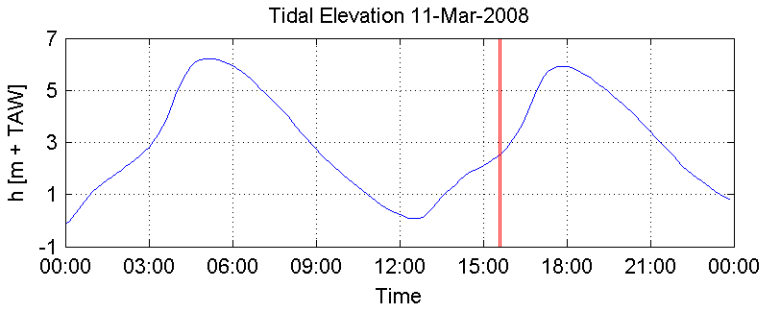
# Through Tide Sediview Measurement Spring tide 11/03/2008

| | |
|---|---|
| 11283 - Aanslibbing Deurganckdok | Equipment(s): ADCP |
| Sourcefile: 3071DGDt_sub.csv | Location: Transect DGD |




HW/LW:
05:00: h = 6.22 m+TAW
12:30: h = 0.08 m+TAW
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Date / Time [MET] :

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15:33 - 15:37

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-2:14

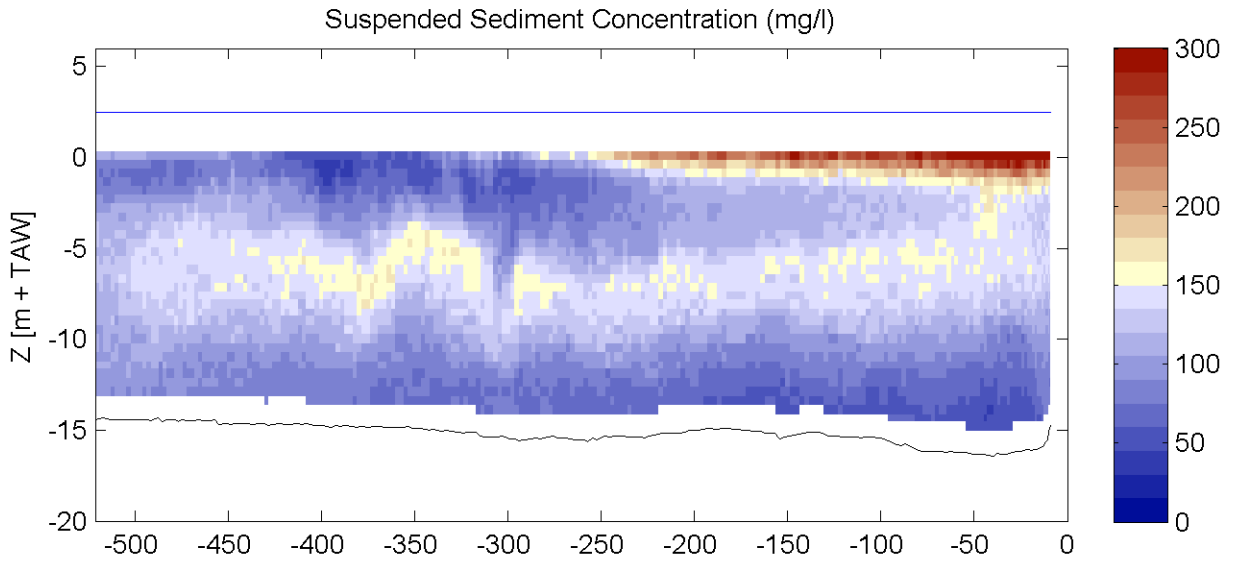
Data Processed by: IMDC

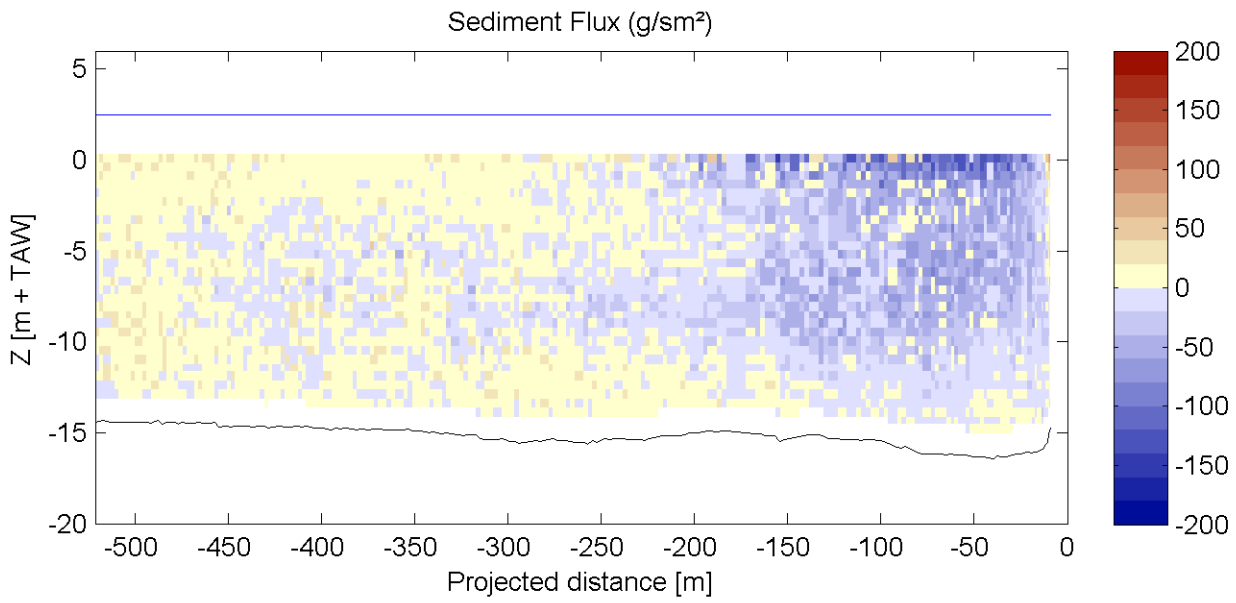
In association with : WL | delft hydraulics, GEMS International

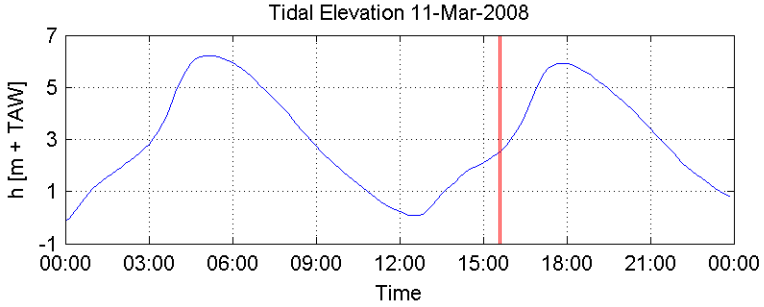
I/RA/11283/07.090/MSA

# Through Tide Sediview Measurement Spring tide 11/03/2008

| | |
|---|---|
| 11283 - Aanslibbing Deurganckdok | Equipment(s): ADCP |
| Sourcefile: 3071DGDt_sub.csv | Location: Transect DGD |




HW/LW:
05:00: h = 6.22 m+TAW
12:30: h = 0.08 m+TAW
17:50: h = 5.93 m+TAW

Date / Time [MET] :

11-Mar-2008

15:33 - 15:37

Time after HW [HH:MM]

-2:14

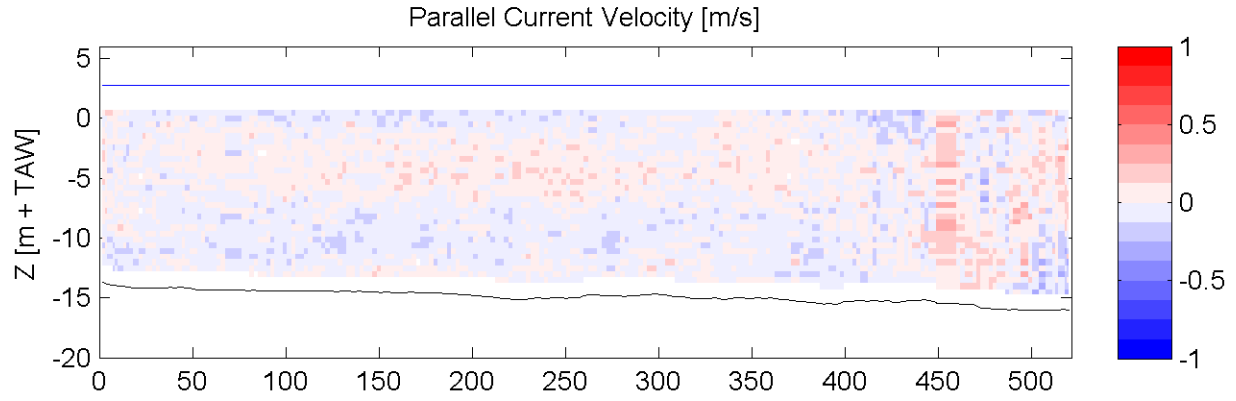
Data Processed by: IMDC

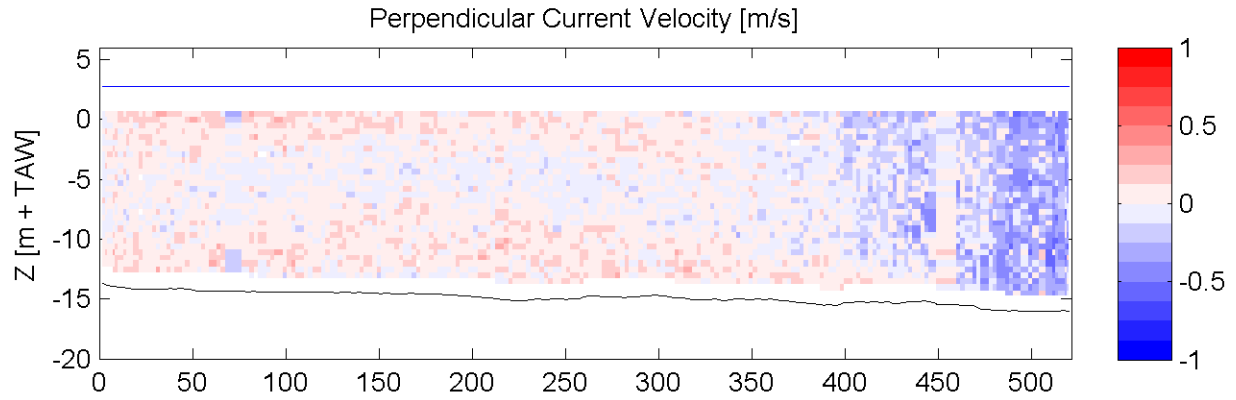
In association with : WL | delft hydraulics, GEMS International

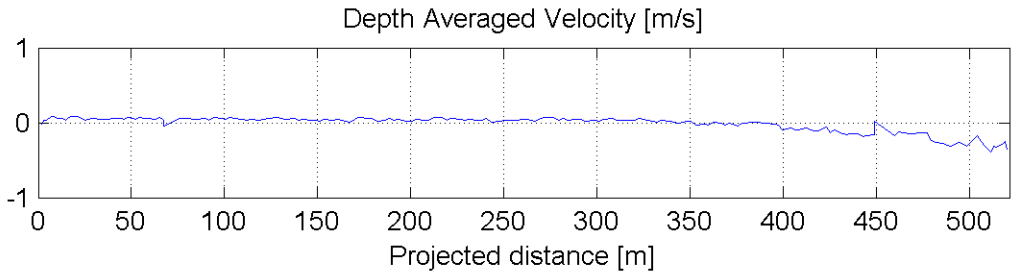
I/RA/11283/07.090/MSA

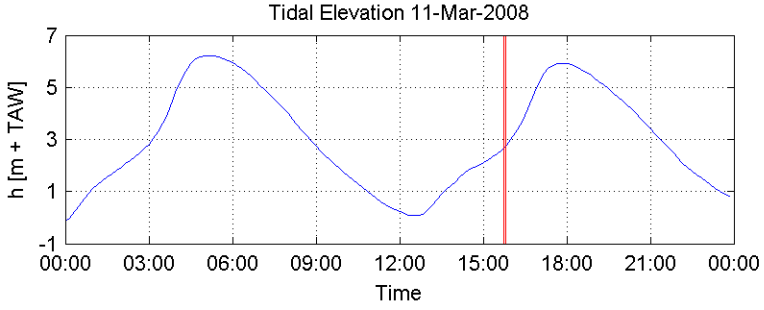
# Through Tide Sediview Measurement Spring tide 11/03/2008

| | |
|---|---|
| 11283 - Aanslibbing Deurganckdok | Equipment(s): ADCP |
| Sourcefile: 3073DGDs_sub.csv | Location: Transect DGD |




HW/LW: 05:00: h = 6.22 m+TAW
12:30: h = 0.08 m+TAW
17:50: h = 5.93 m+TAW

Date / Time [MET] :

11-Mar-2008

15:45 - 15:49

Time after HW [HH:MM]

-2:02

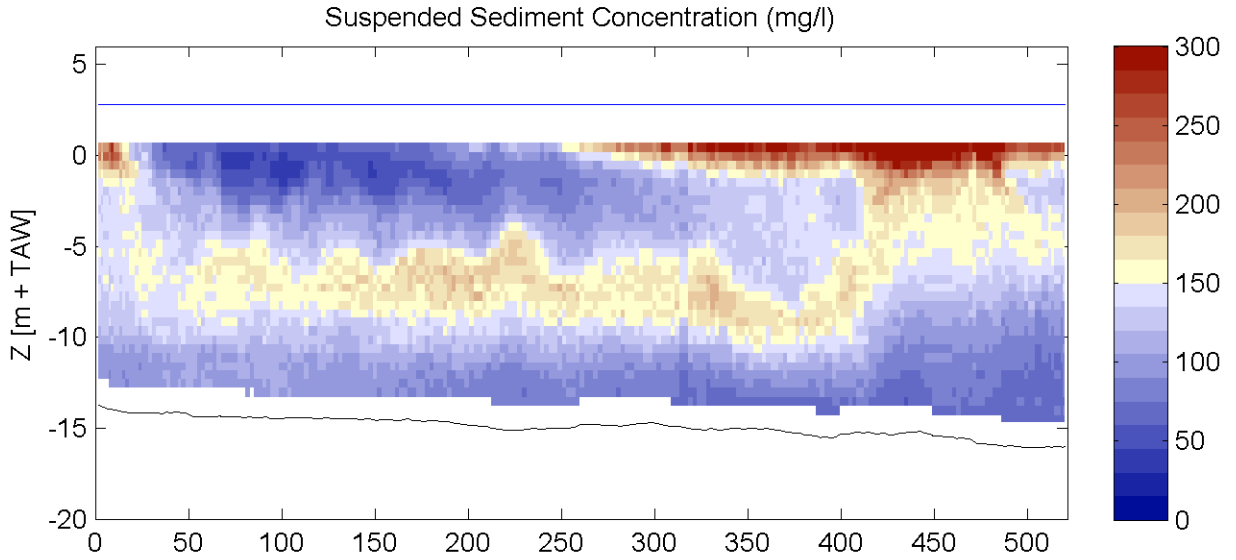
Data Processed by: IMDC

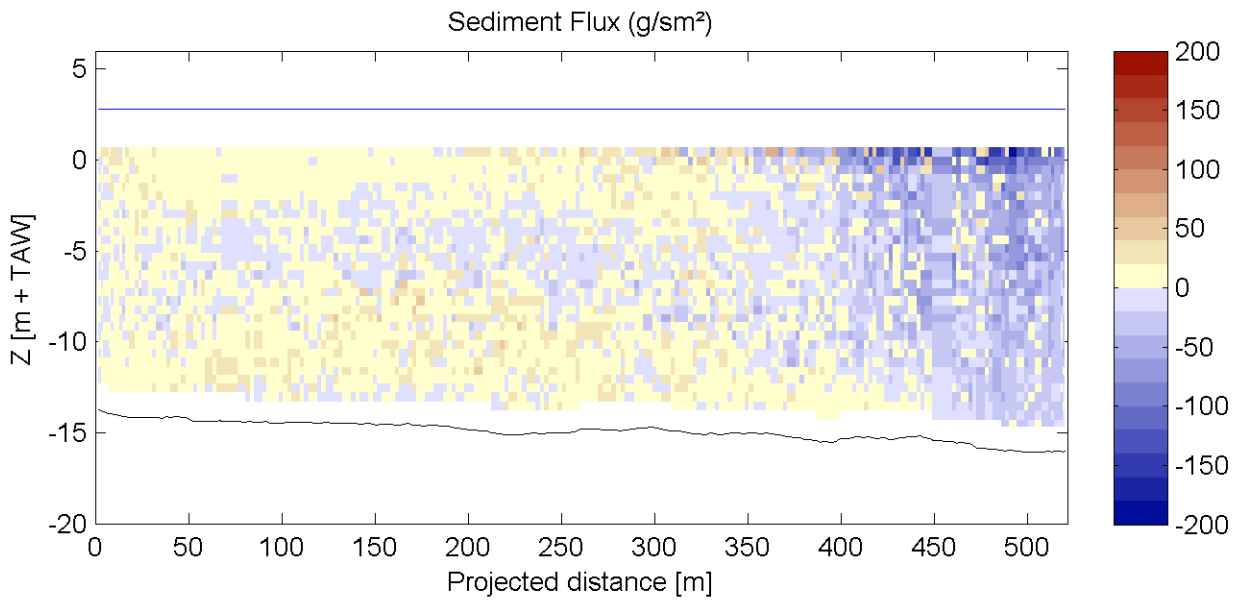
In association with : w.l | delft hydraulics, GEMS International

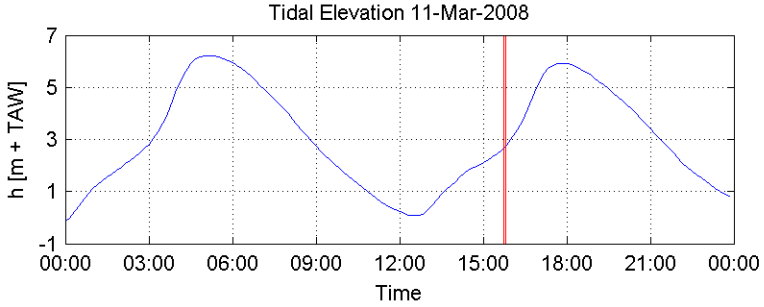
I/RA/11283/07.090/MSA

# Through Tide Sediview Measurement Spring tide 11/03/2008

| | |
|---|---|
| 11283 - Aanslibbing Deurganckdok | Equipment(s): ADCP |
| Sourcefile: 3073DGDs_sub.csv | Location: Transect DGD |




HW/LW:
05:00: h = 6.22 m+TAW
12:30: h = 0.08 m+TAW
17:50: h = 5.93 m+TAW

Date / Time [MET] :

11-Mar-2008

15:45 - 15:49

Time after HW [HH:MM]

-2:02

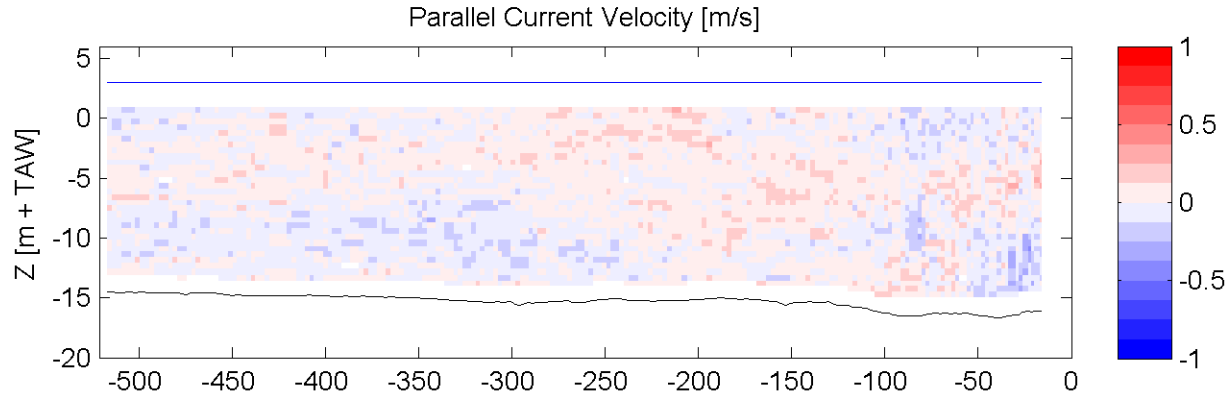
Data Processed by: IMDC

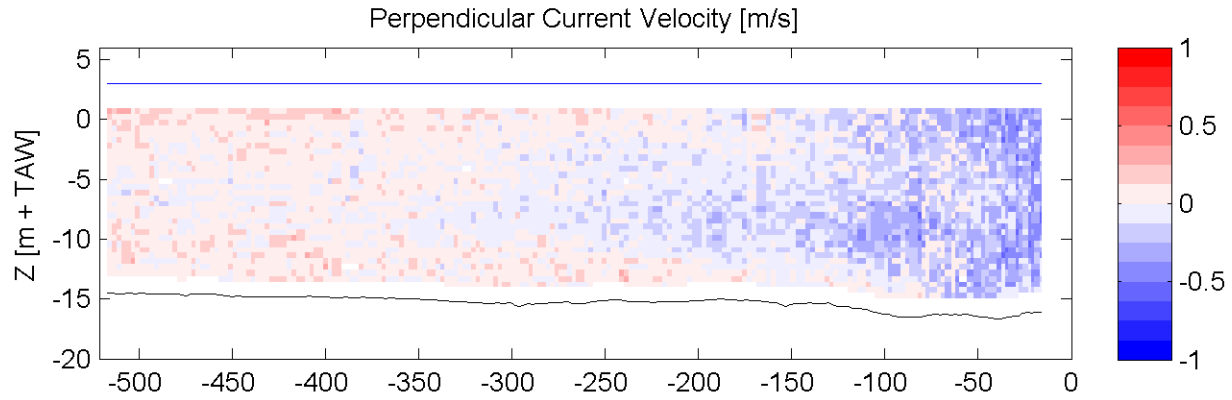
In association with : w.l | delft hydraulics, GEMS International

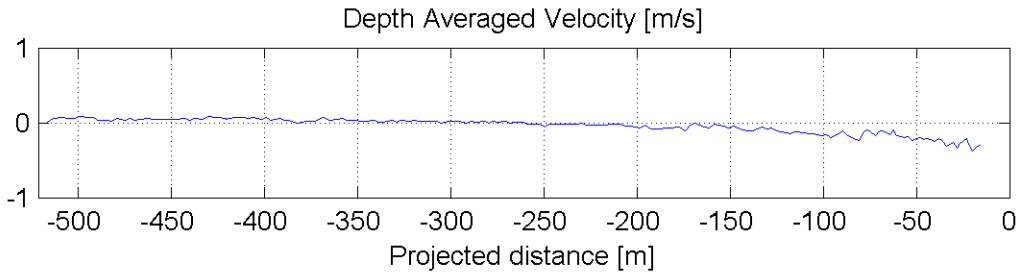
I/RA/11283/07.090/MSA

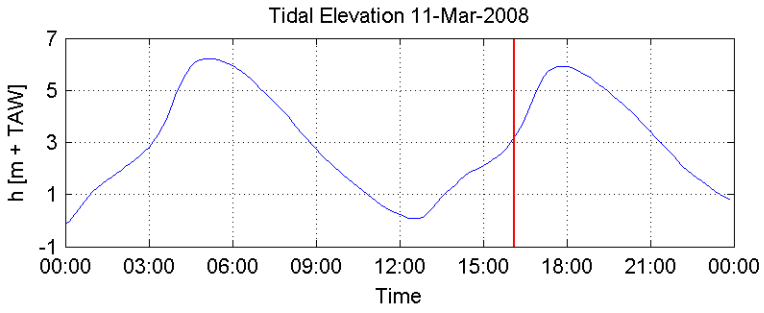
# Through Tide Sediview Measurement Spring tide 11/03/2008

| | |
|---|---|
| 11283 - Aanslibbing Deurganckdok | Equipment(s): ADCP |
| Sourcefile: 3075DGDt_sub.csv | Location: Transect DGD |




HW/LW:
05:00: h = 6.22 m+TAW
12:30: h = 0.08 m+TAW
17:50: h = 5.93 m+TAW

Date / Time [MET] :

11-Mar-2008

16:04 - 16:08

Time after HW [HH:MM]

-1:43

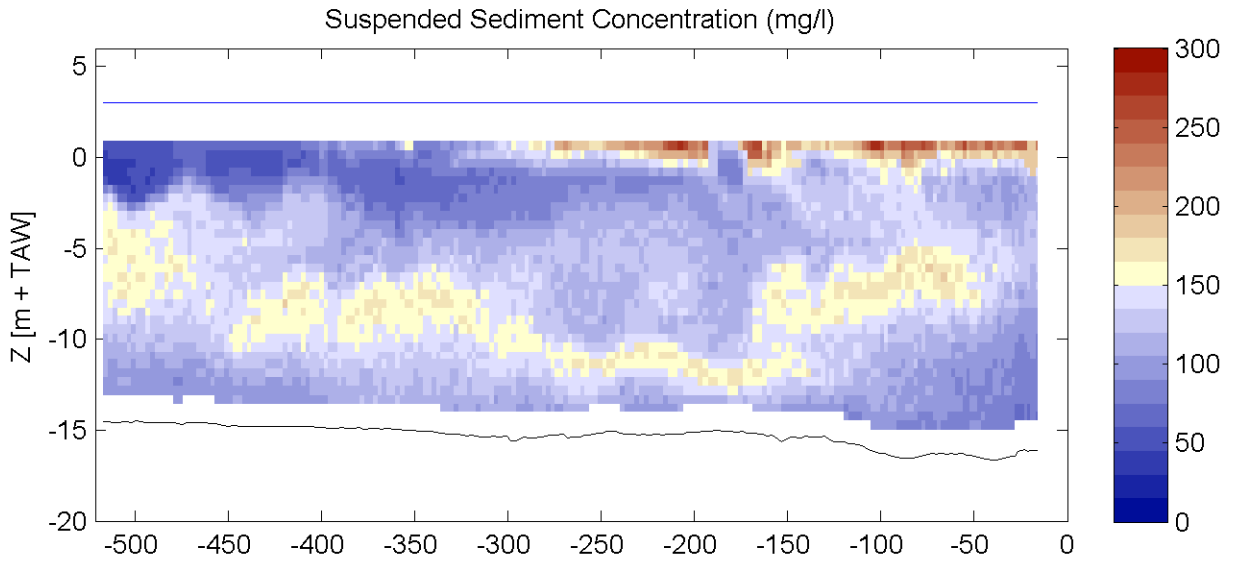
Data Processed by: IMDC

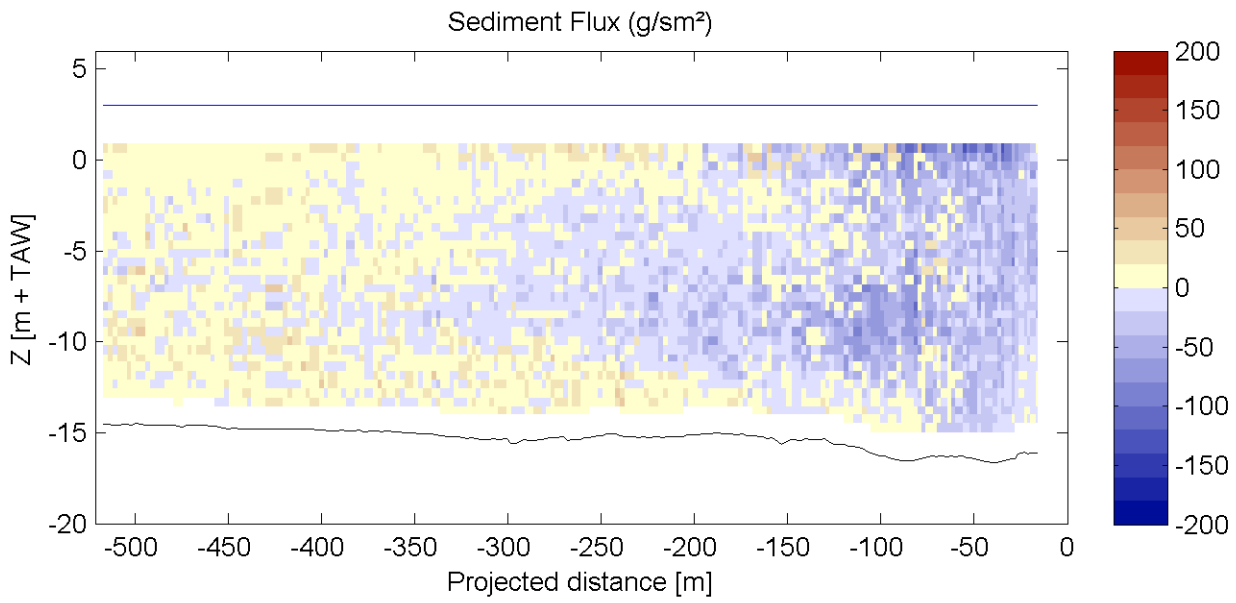
In association with : w.l | delft hydraulics, GEMS International

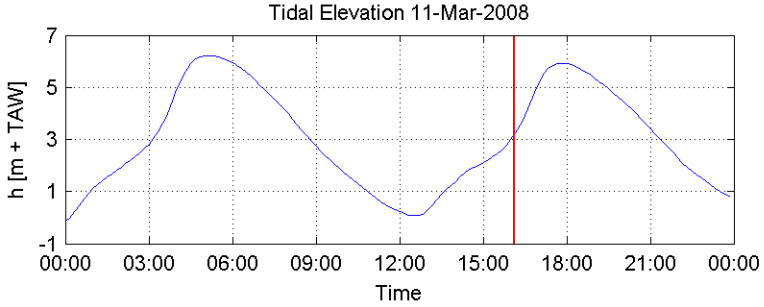
I/RA/11283/07.090/MSA

# Through Tide Sediview Measurement Spring tide 11/03/2008

| | |
|---|---|
| 11283 - Aanslibbing Deurganckdok | Equipment(s): ADCP |
| Sourcefile: 3075DGDt_sub.csv | Location: Transect DGD |




HW/LW:
05:00: h = 6.22 m+TAW
12:30: h = 0.08 m+TAW
17:50: h = 5.93 m+TAW

Date / Time [MET] :

11-Mar-2008

16:04 - 16:08

Time after HW [HH:MM]

-1:43

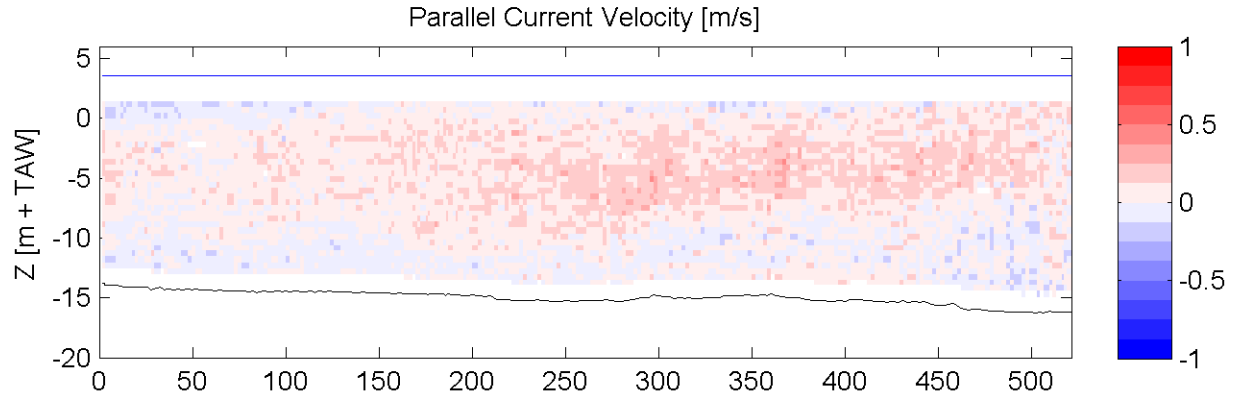
Data Processed by: IMDC

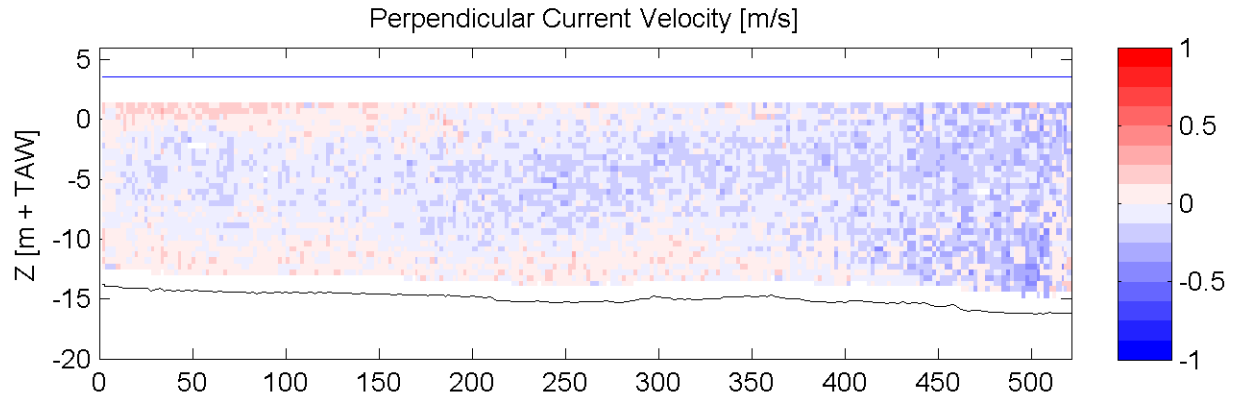
In association with : WL | delft hydraulics, GEMS International

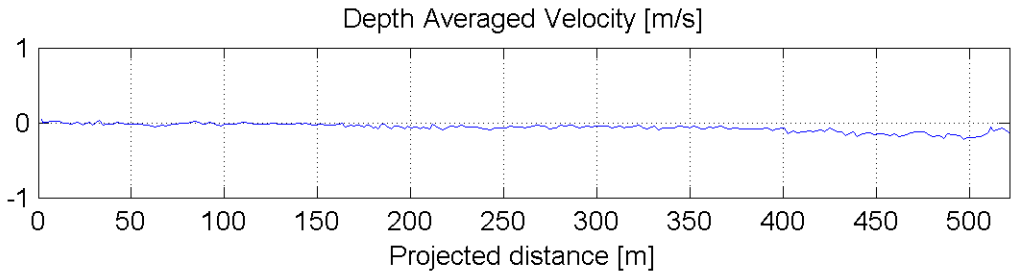
I/RA/11283/07.090/MSA

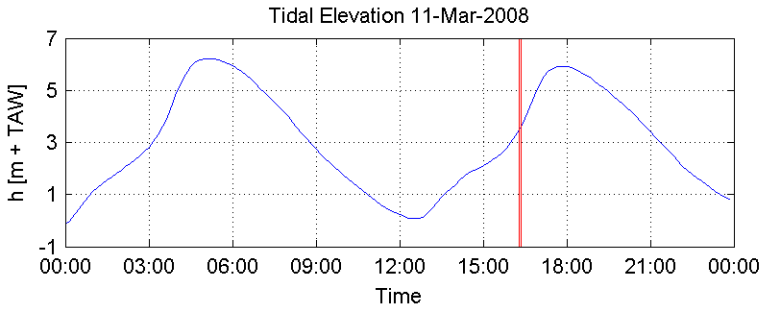
# Through Tide Sediview Measurement Spring tide 11/03/2008

| | |
|---|---|
| 11283 - Aanslibbing Deurganckdok | Equipment(s): ADCP |
| Sourcefile: 3077DGDs_sub.csv | Location: Transect DGD |




HW/LW: 05:00: h = 6.22 m+TAW
12:30: h = 0.08 m+TAW
17:50: h = 5.93 m+TAW

Date / Time [MET] :

11-Mar-2008

16:16 - 16:21

Time after HW [HH:MM]

-1:31

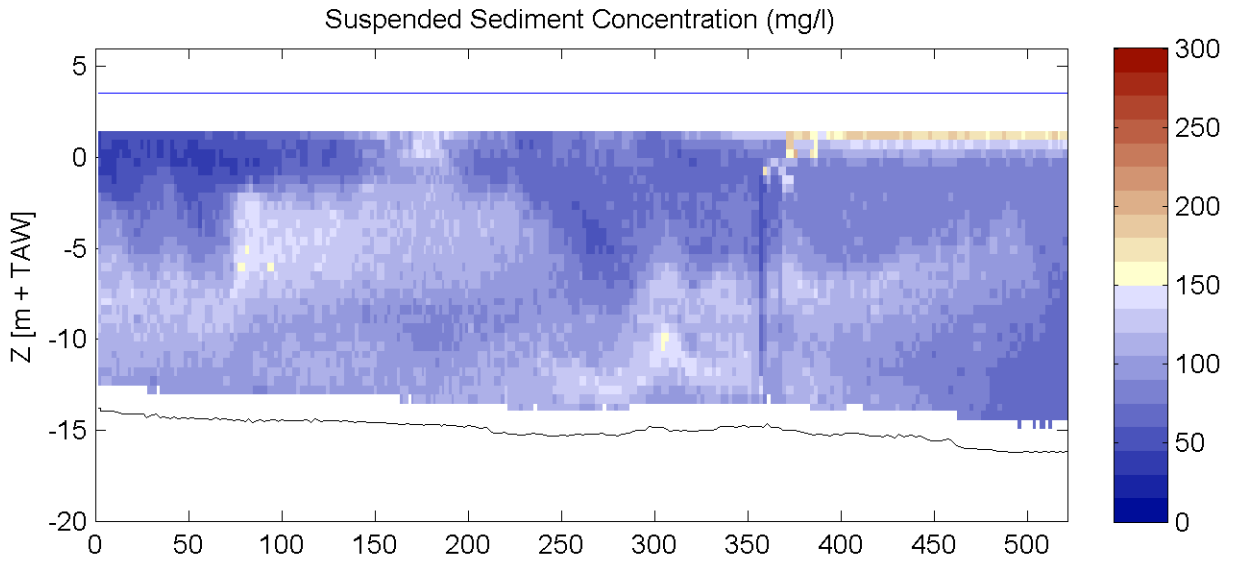
Data Processed by: IMDC

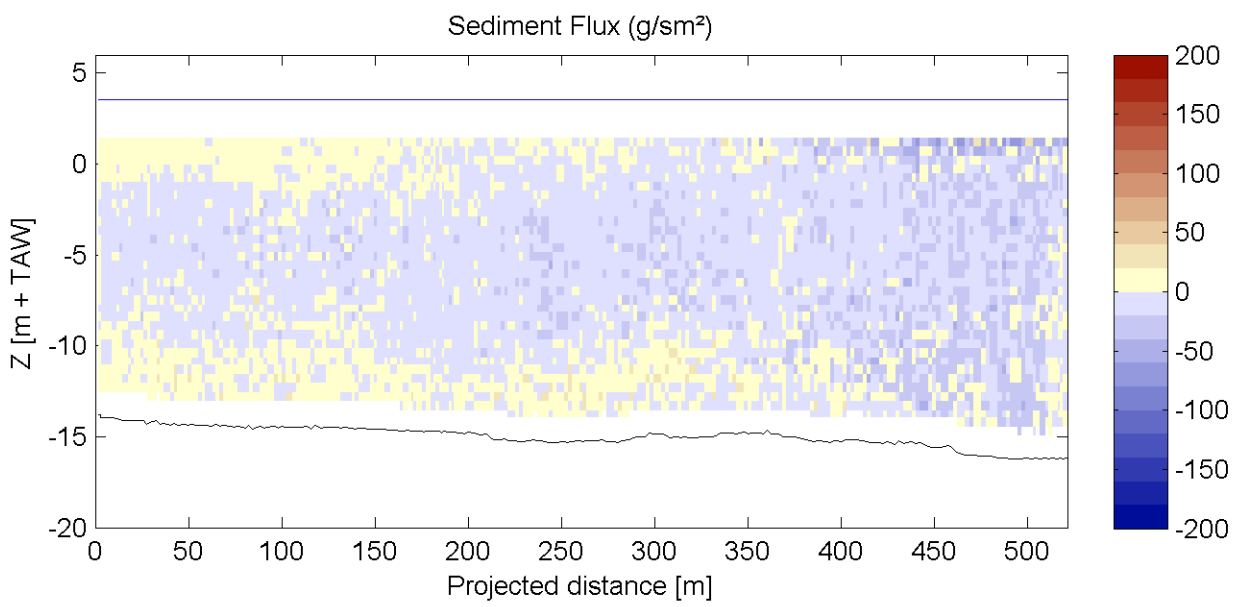
In association with : WL | delft hydraulics, GEMS International

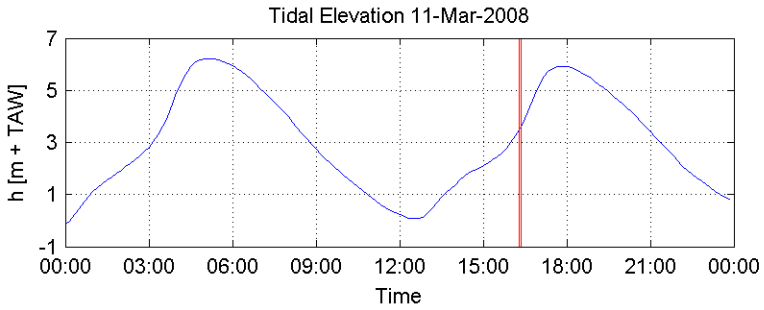
I/RA/11283/07.090/MSA

# Through Tide Sediview Measurement Spring tide 11/03/2008

| | |
|---|---|
| 11283 - Aanslibbing Deurganckdok | Equipment(s): ADCP |
| Sourcefile: 3077DGDs_sub.csv | Location: Transect DGD |




HW/LW:
05:00: h = 6.22 m+TAW
12:30: h = 0.08 m+TAW
17:50: h = 5.93 m+TAW

Date / Time [MET] :

11-Mar-2008

16:16 - 16:21

Time after HW [HH:MM]

-1:31

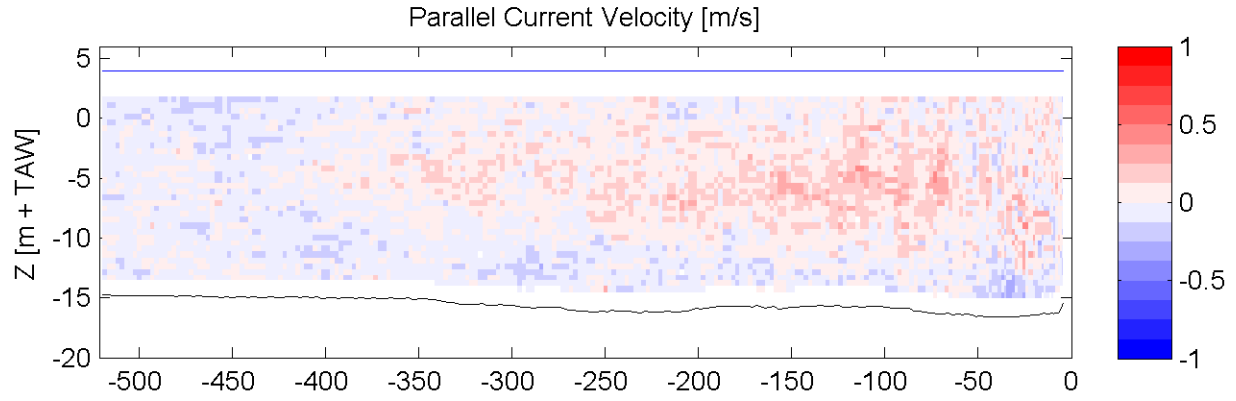
Data Processed by: IMDC

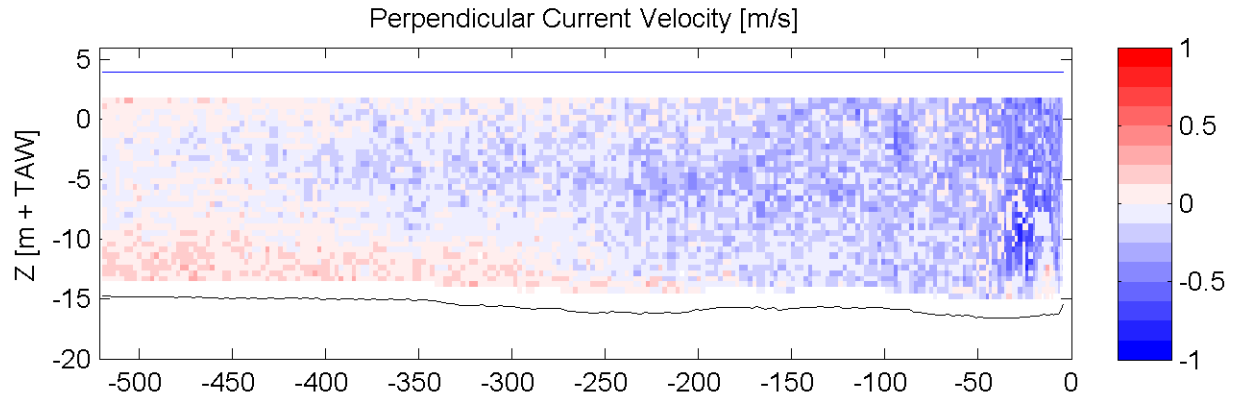
In association with : WL | delft hydraulics, GEMS International

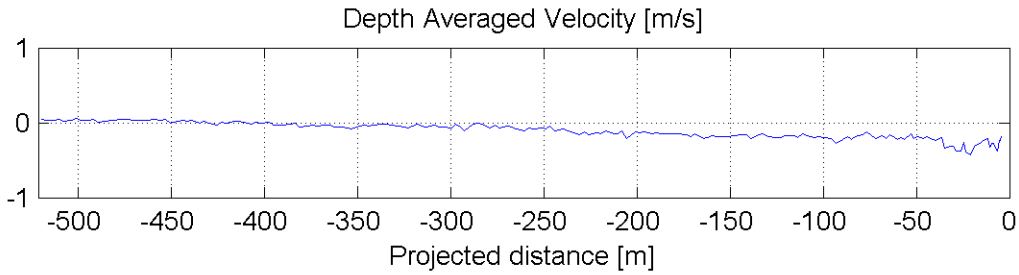
I/RA/11283/07.090/MSA

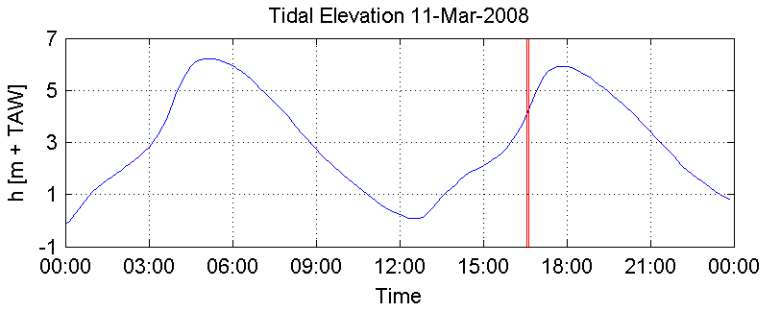
# Through Tide Sediview Measurement Spring tide 11/03/2008

| | |
|---|---|
| 11283 - Aanslibbing Deurganckdok | Equipment(s): ADCP |
| Sourcefile: 3079DGDt_sub.csv | Location: Transect DGD |




HW/LW:
05:00: h = 6.22 m+TAW
12:30: h = 0.08 m+TAW
17:50: h = 5.93 m+TAW

Date / Time [MET] :

11-Mar-2008

16:33 - 16:37

Time after HW [HH:MM]

-1:14

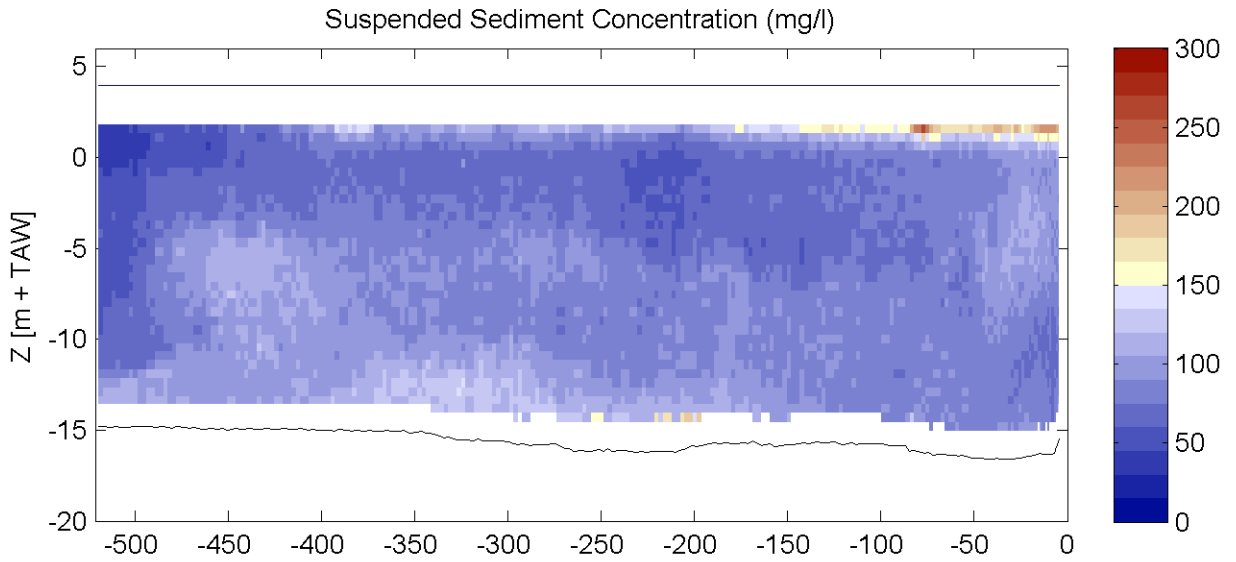
Data Processed by: IMDC

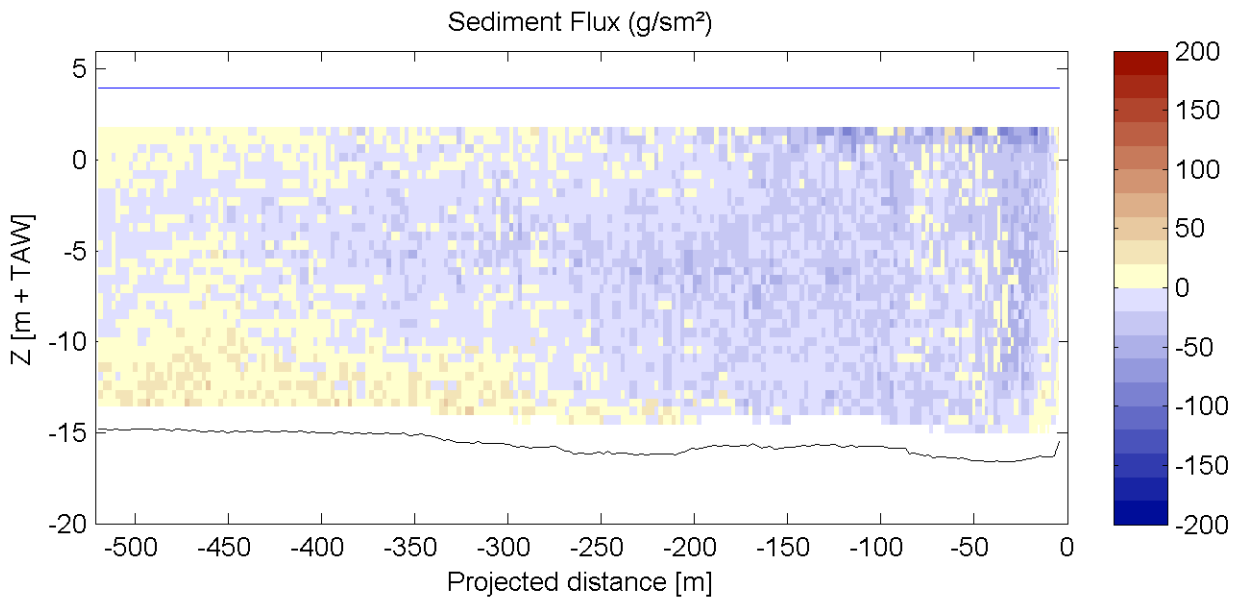
In association with : w.l | delft hydraulics, GEMS International

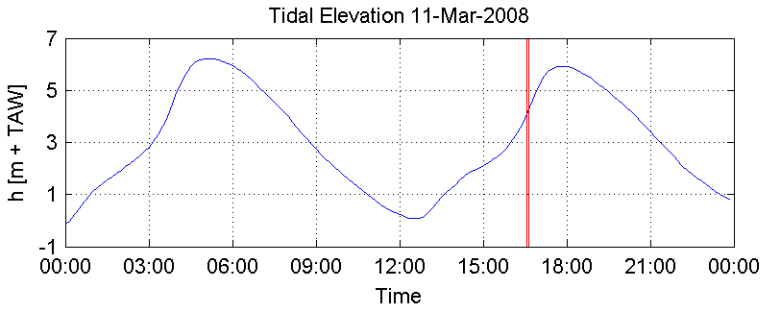
I/RA/11283/07.090/MSA

# Through Tide Sediview Measurement Spring tide 11/03/2008

| | |
|---|---|
| 11283 - Aanslibbing Deurganckdok | Equipment(s): ADCP |
| Sourcefile: 3079DGDt_sub.csv | Location: Transect DGD |




HW/LW: 05:00: h = 6.22 m+TAW
12:30: h = 0.08 m+TAW
17:50: h = 5.93 m+TAW

Date / Time [MET] :

11-Mar-2008

16:33 - 16:37

Time after HW [HH:MM]

-1:14

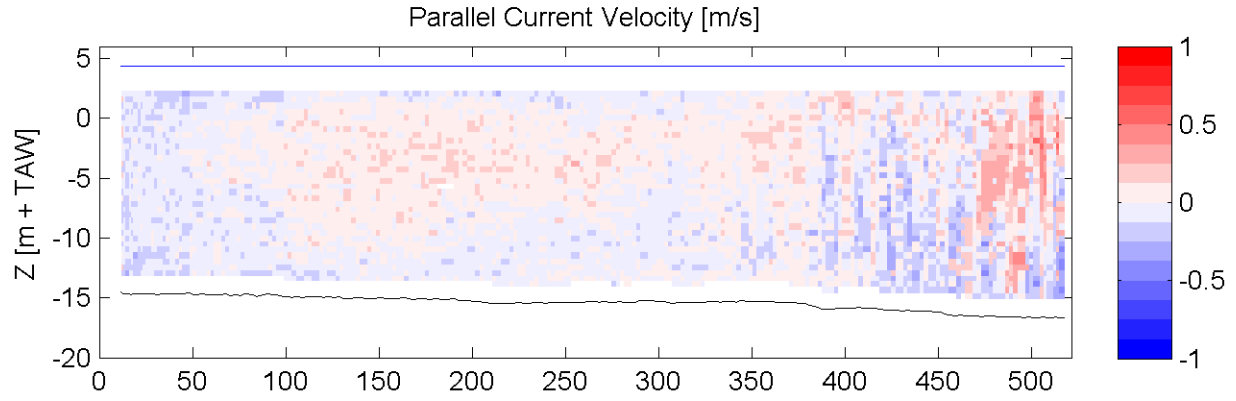
Data Processed by: IMDC

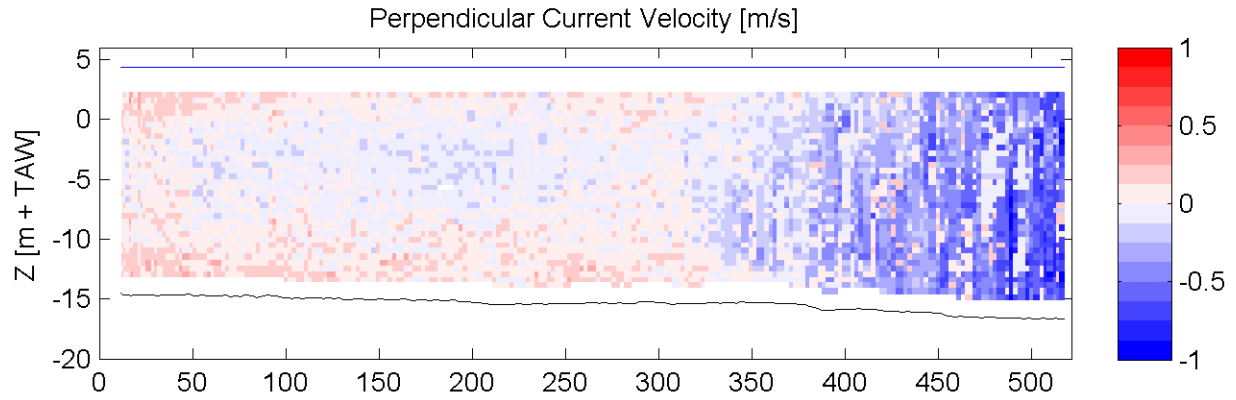
In association with : WL | delft hydraulics, GEMS International

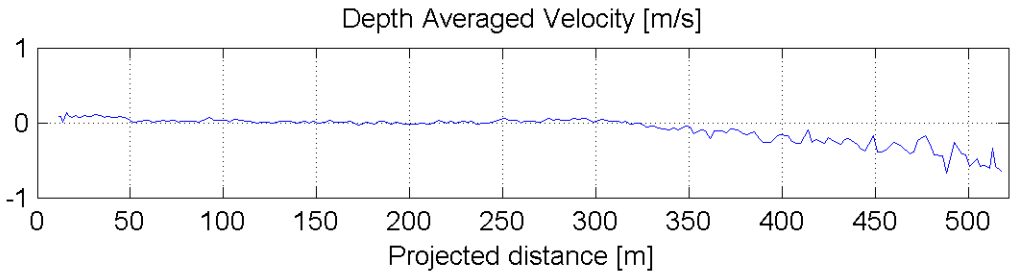
I/RA/11283/07.090/MSA

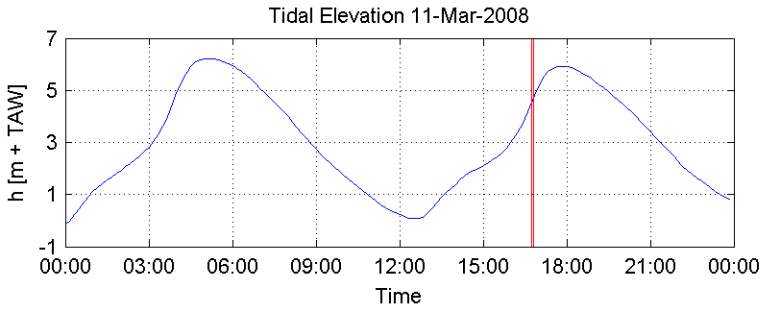
# Through Tide Sediview Measurement Spring tide 11/03/2008

| | |
|---|---|
| 11283 - Aanslibbing Deurganckdok | Equipment(s): ADCP |
| Sourcefile: 3081DGDs_sub.csv | Location: Transect DGD |




HW/LW:
05:00: h = 6.22 m+TAW
12:30: h = 0.08 m+TAW
17:50: h = 5.93 m+TAW

Date / Time [MET] :

11-Mar-2008

16:44 - 16:48

Time after HW [HH:MM]

-1:03

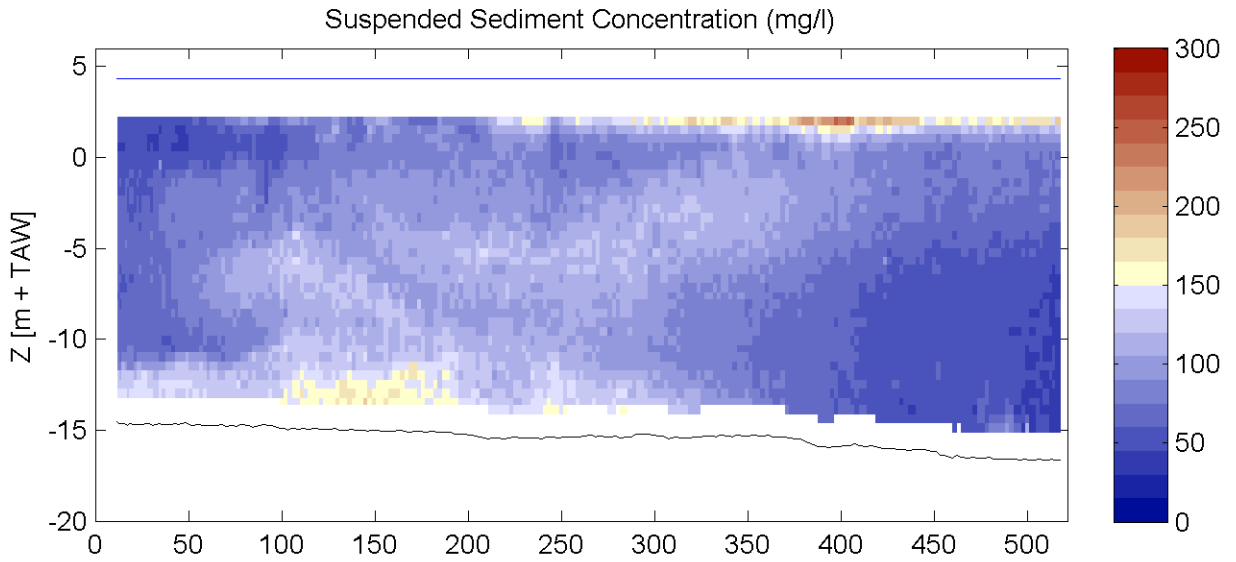
Data Processed by: IMDC

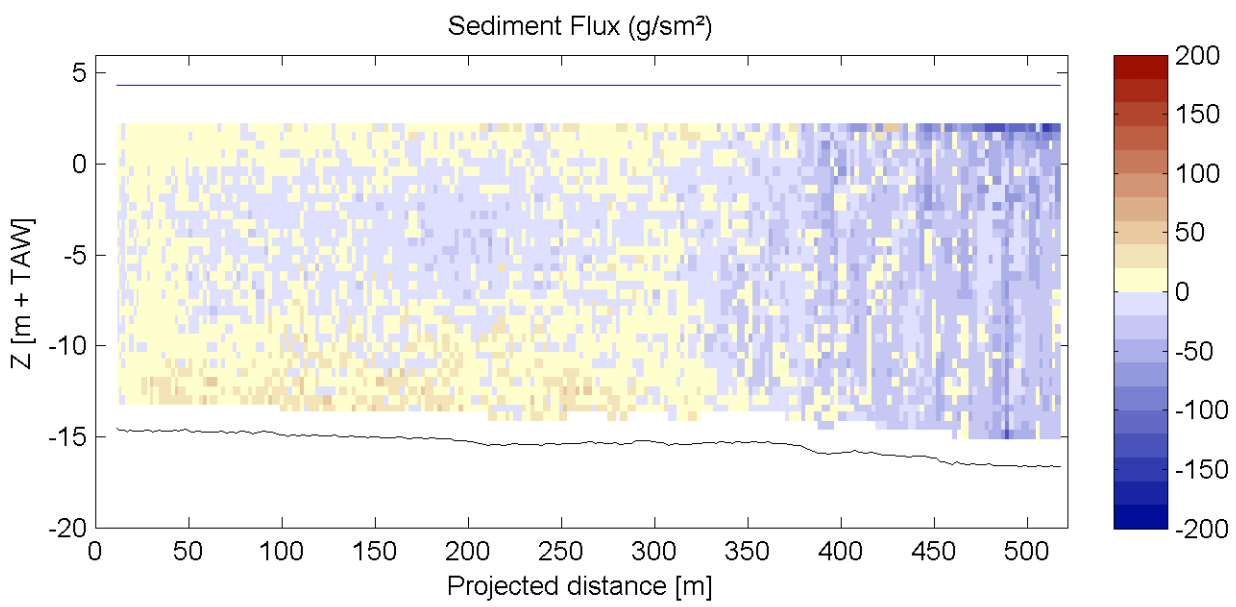
In association with : WL | delft hydraulics, GEMS International

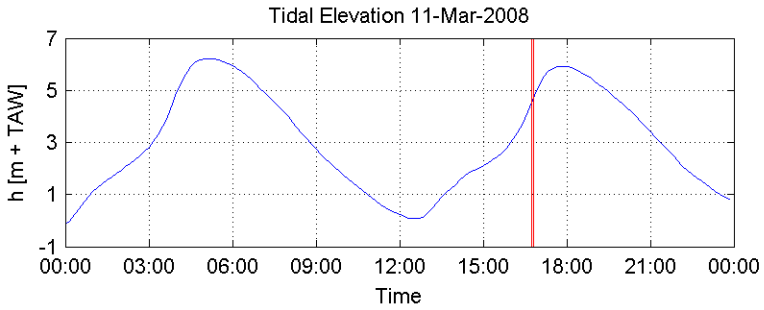
I/RA/11283/07.090/MSA

# Through Tide Sediview Measurement Spring tide 11/03/2008

| | |
|---|---|
| 11283 - Aanslibbing Deurganckdok | Equipment(s): ADCP |
| Sourcefile: 3081DGDs_sub.csv | Location: Transect DGD |




HW/LW:
05:00: h = 6.22 m+TAW
12:30: h = 0.08 m+TAW
17:50: h = 5.93 m+TAW

Date / Time [MET] :

11-Mar-2008

16:44 - 16:48

Time after HW [HH:MM]

-1:03

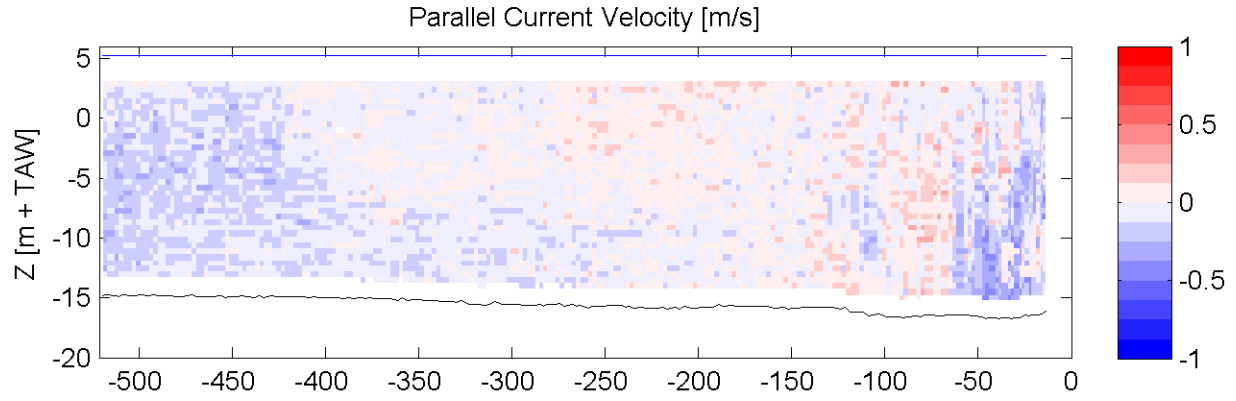
Data Processed by: IMDC

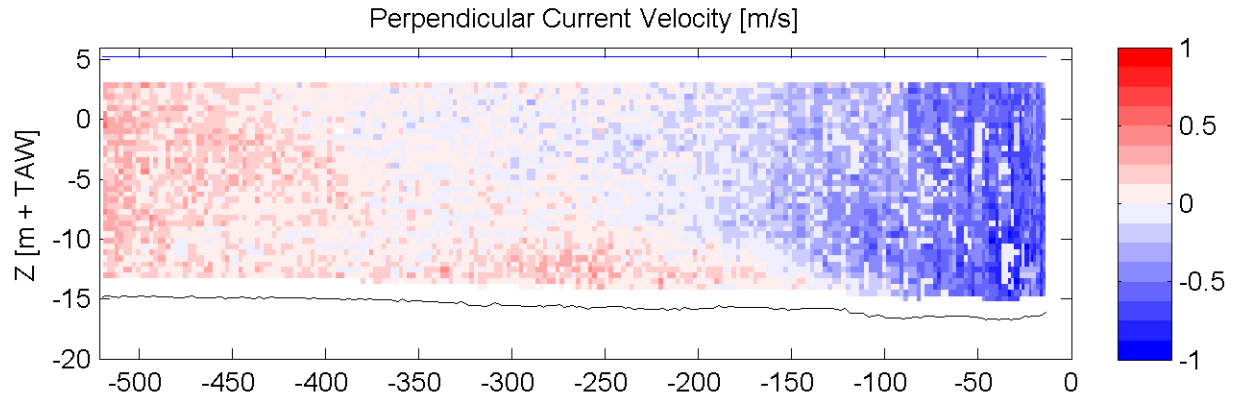
In association with : w.l | delft hydraulics, GEMS International

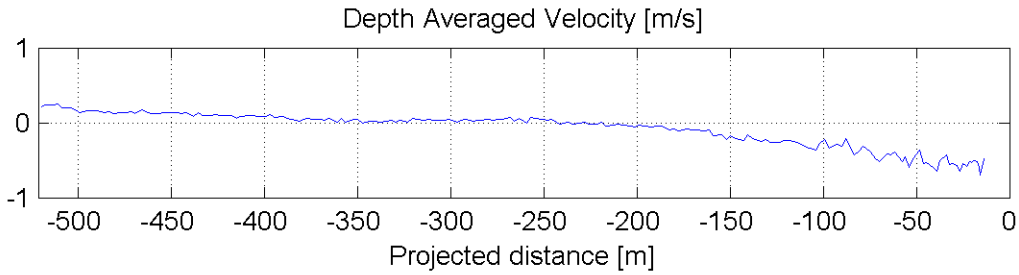
I/RA/11283/07.090/MSA

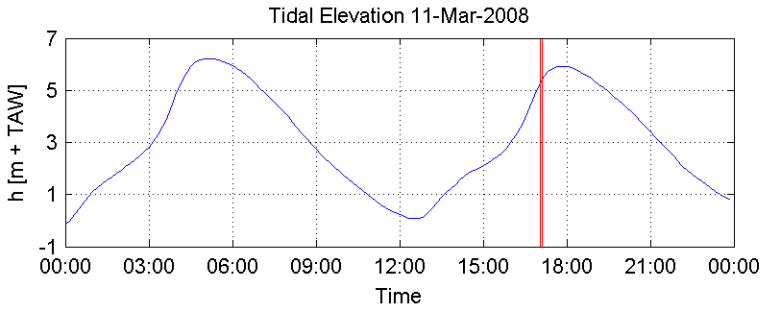
# Through Tide Sediview Measurement Spring tide 11/03/2008

| | |
|---|---|
| 11283 - Aanslibbing Deurganckdok | Equipment(s): ADCP |
| Sourcefile: 3083DGDt_sub.csv | Location: Transect DGD |




HW/LW: 05:00: h = 6.22 m+TAW
12:30: h = 0.08 m+TAW
17:50: h = 5.93 m+TAW

Date / Time [MET] :

11-Mar-2008

17:03 - 17:07

Time after HW [HH:MM]

-0:44

Data Processed by: IMDC

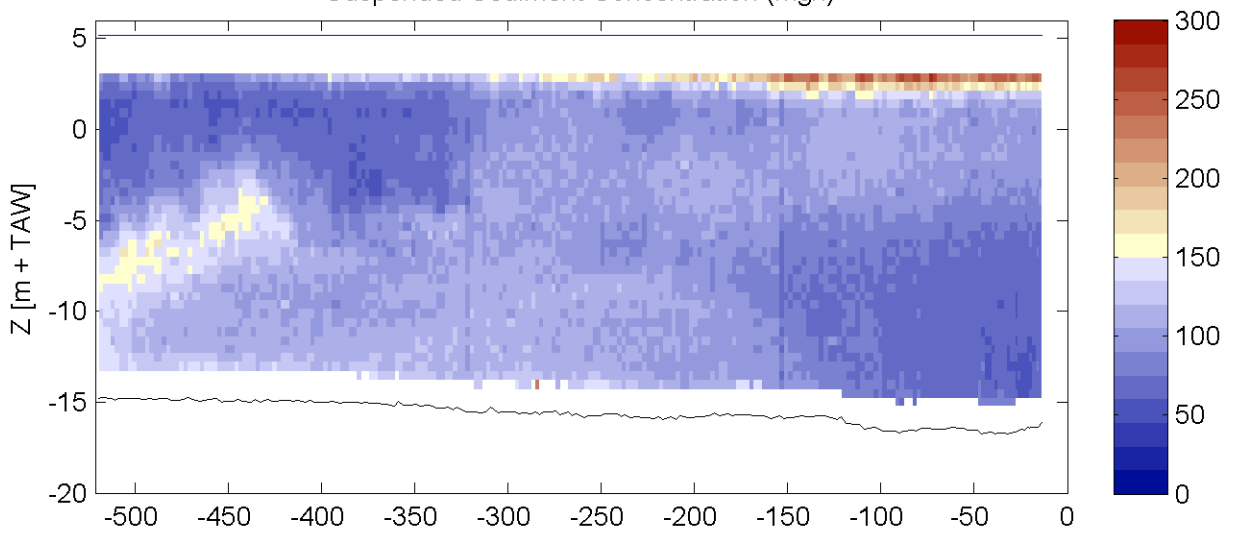
In association with : w.l | delft hydraulics, GEMS International

I/RA/11283/07.090/MSA

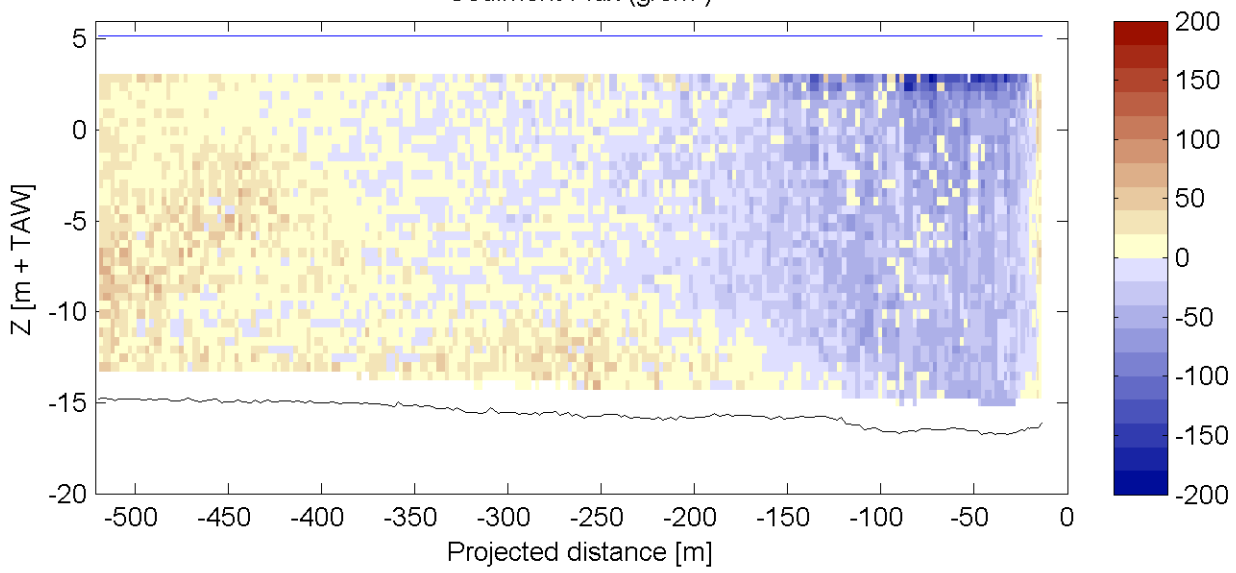
# Through Tide Sediview Measurement Spring tide 11/03/2008

| | |
|---|---|
| 11283 - Aanslibbing Deurganckdok | Equipment(s): ADCP |
| Sourcefile: 3083DGDt_sub.csv | Location: Transect DGD |

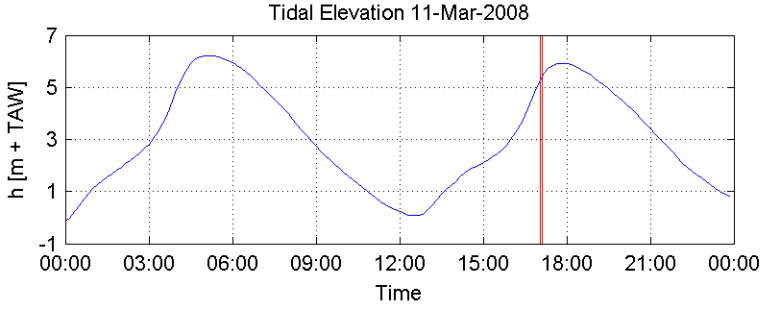
Suspended Sediment Concentration (mg/l)




Sediment Flux (g/sm²)




Tidal Elevation 11-Mar-2008




HW/LW:
05:00: h = 6.22 m+TAW
12:30: h = 0.08 m+TAW
17:50: h = 5.93 m+TAW

Date / Time [MET] :

11-Mar-2008

17:03 - 17:07

Time after HW [HH:MM]

-0:44

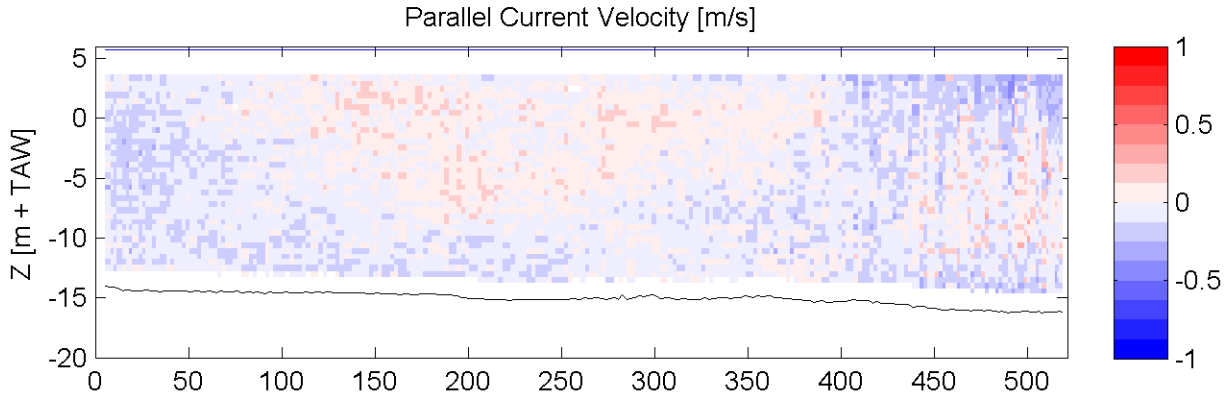
Data Processed by: IMDC

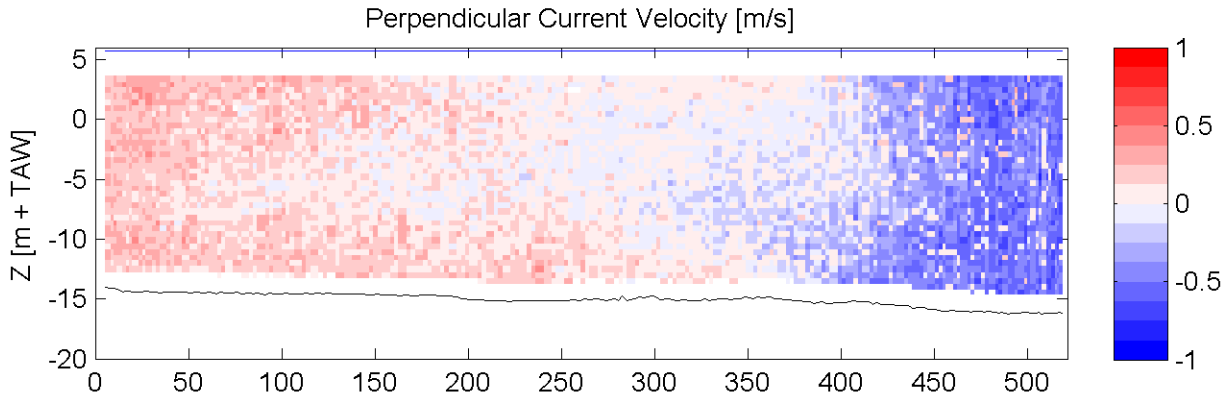
In association with : WL | delft hydraulics, GEMS International

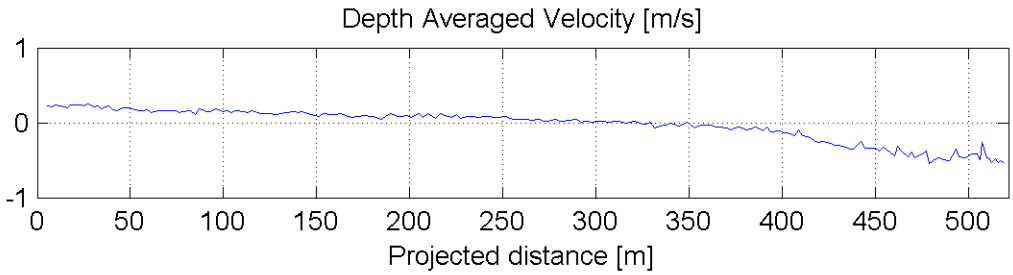
I/RA/11283/07.090/MSA

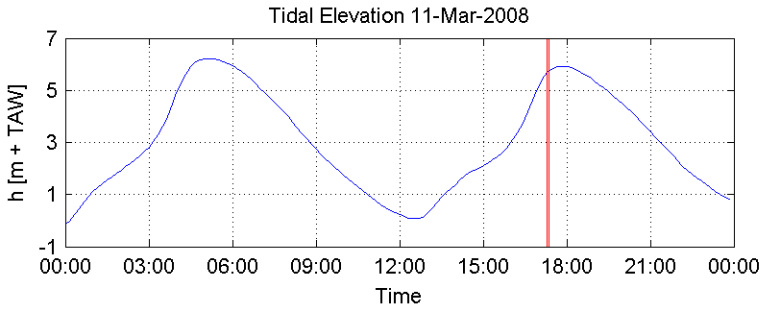
# Through Tide Sediview Measurement Spring tide 11/03/2008

| | |
|---|---|
| 11283 - Aanslibbing Deurganckdok | Equipment(s): ADCP |
| Sourcefile: 3085DGDs_sub.csv | Location: Transect DGD |




HW/LW: 05:00: h = 6.22 m+TAW
12:30: h = 0.08 m+TAW
17:50: h = 5.93 m+TAW

Date / Time [MET] :

11-Mar-2008

17:17 - 17:21

Time after HW [HH:MM]

-0:30

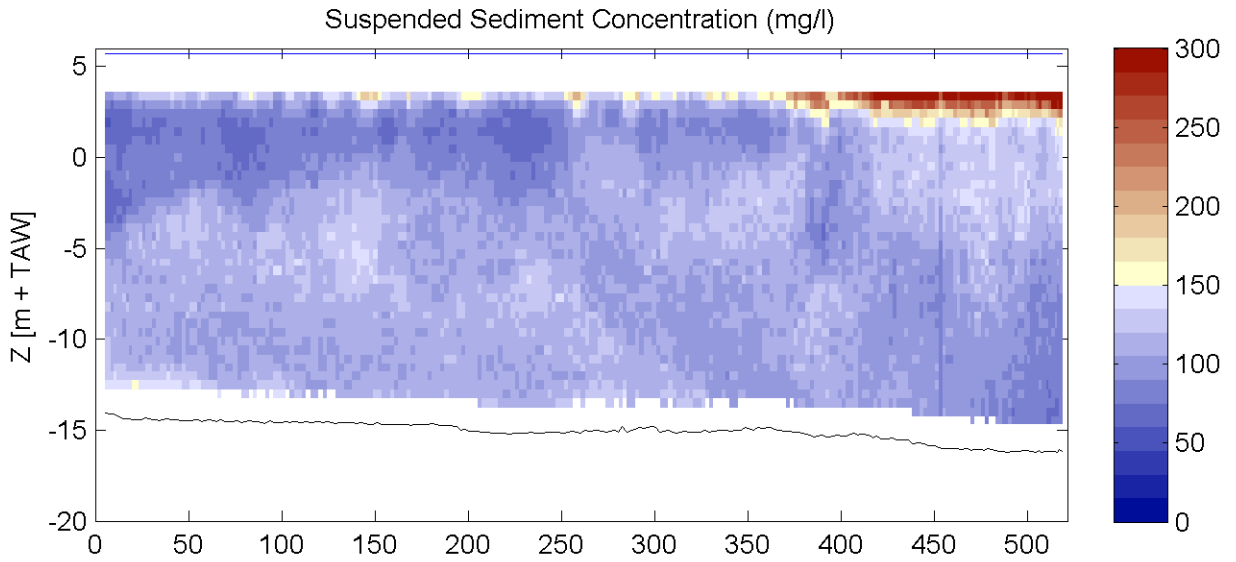
Data Processed by: IMDC

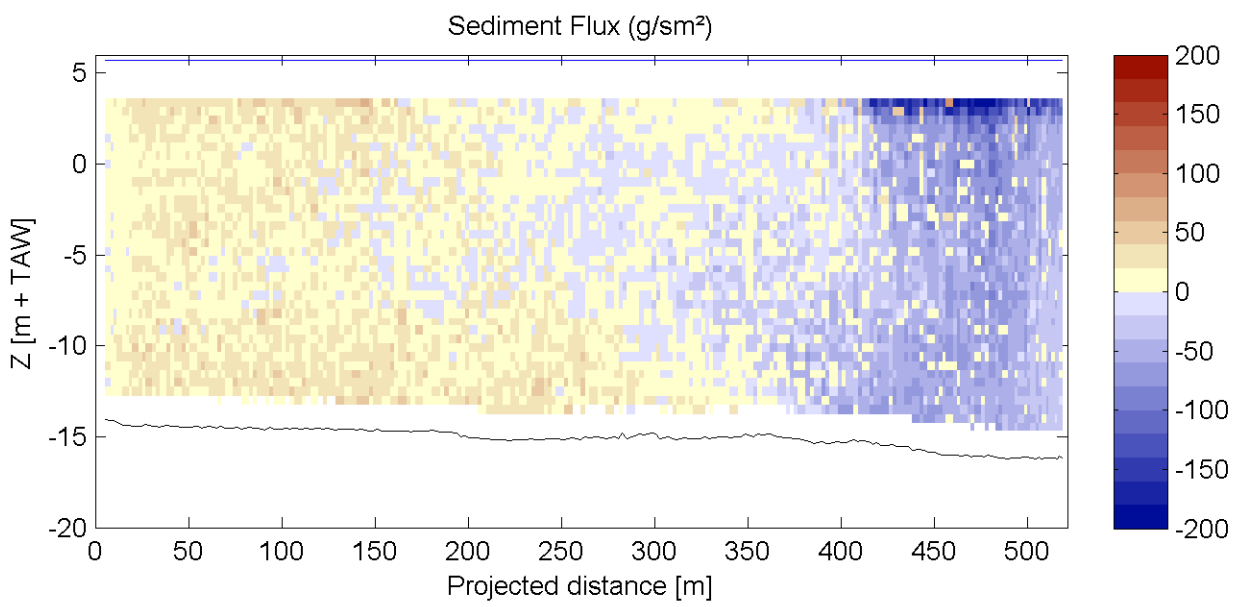
In association with : w.l | delft hydraulics, GEMS International

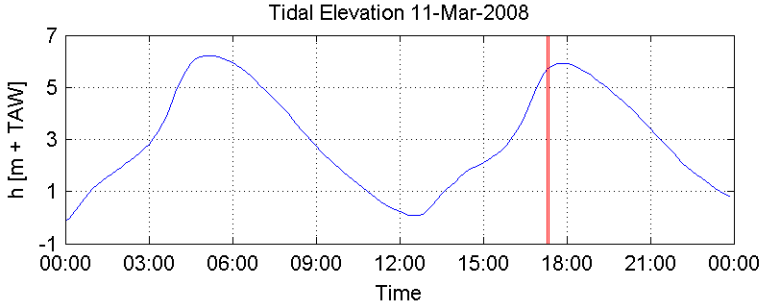
I/RA/11283/07.090/MSA

# Through Tide Sediview Measurement Spring tide 11/03/2008

| | |
|---|---|
| 11283 - Aanslibbing Deurganckdok | Equipment(s): ADCP |
| Sourcefile: 3085DGDs_sub.csv | Location: Transect DGD |




HW/LW:
05:00: h = 6.22 m+TAW
12:30: h = 0.08 m+TAW
17:50: h = 5.93 m+TAW

Date / Time [MET] :

11-Mar-2008

17:17 - 17:21

Time after HW [HH:MM]

-0:30

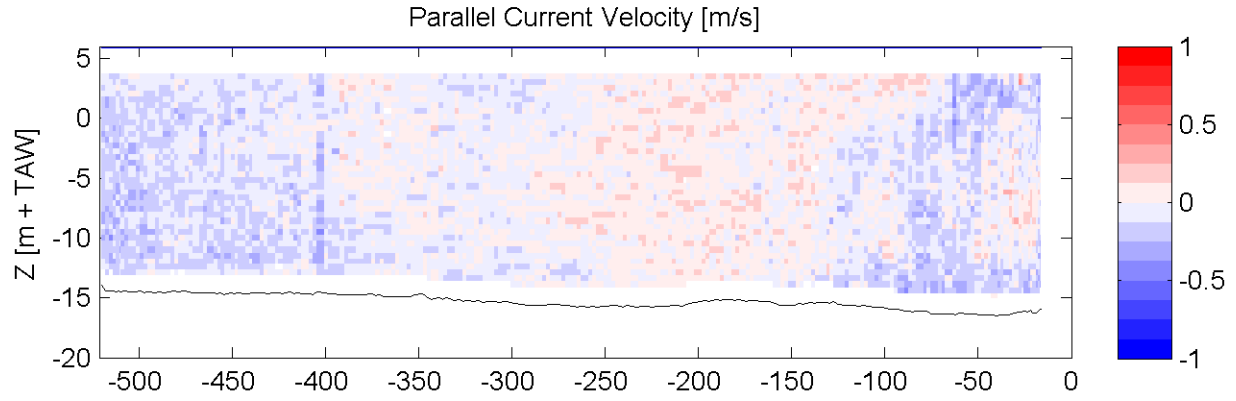
Data Processed by: IMDC

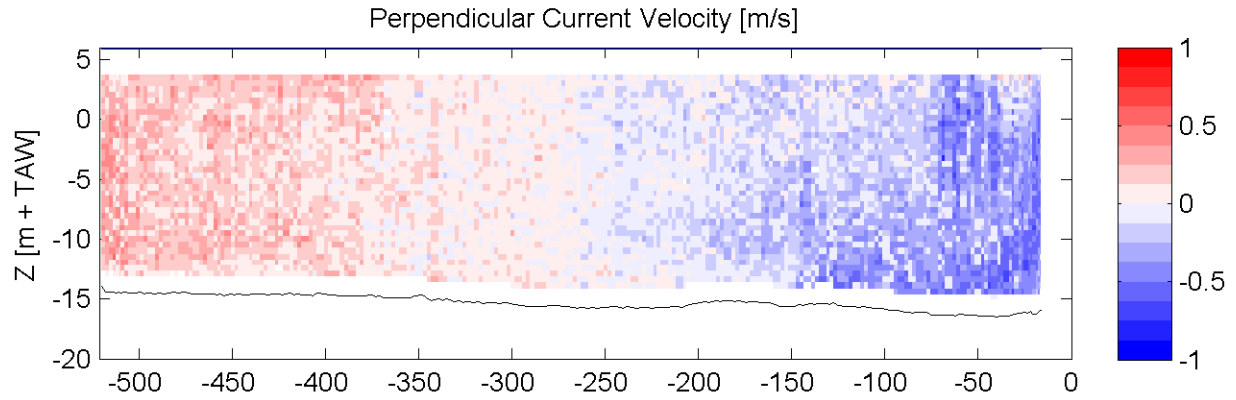
In association with : w.l | delft hydraulics, GEMS International

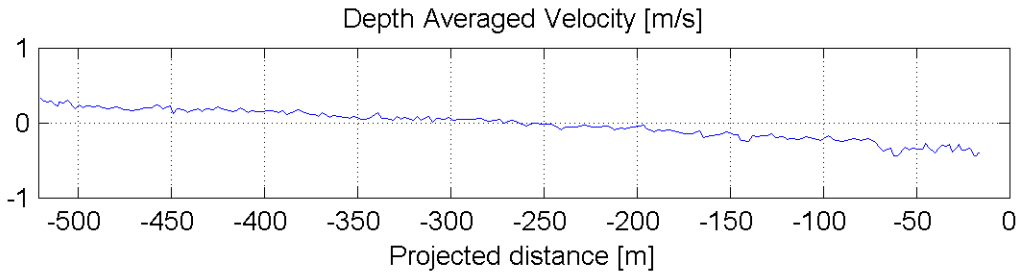
I/RA/11283/07.090/MSA

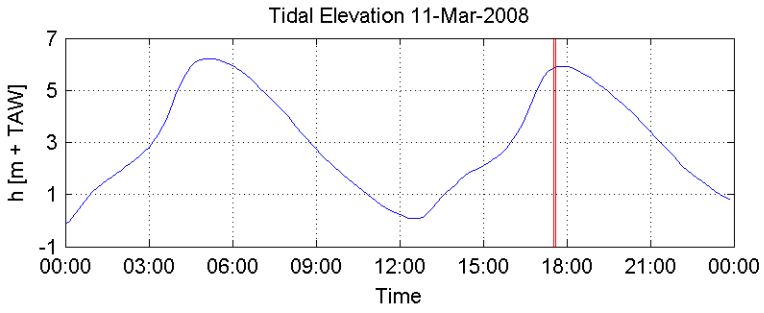
# Through Tide Sediview Measurement Spring tide 11/03/2008

| | |
|---|---|
| 11283 - Aanslibbing Deurganckdok | Equipment(s): ADCP |
| Sourcefile: 3087DGDt_sub.csv | Location: Transect DGD |




HW/LW:
05:00: h = 6.22 m+TAW
12:30: h = 0.08 m+TAW
17:50: h = 5.93 m+TAW

Date / Time [MET] :

11-Mar-2008

17:31 - 17:35

Time after HW [HH:MM]

-0:16

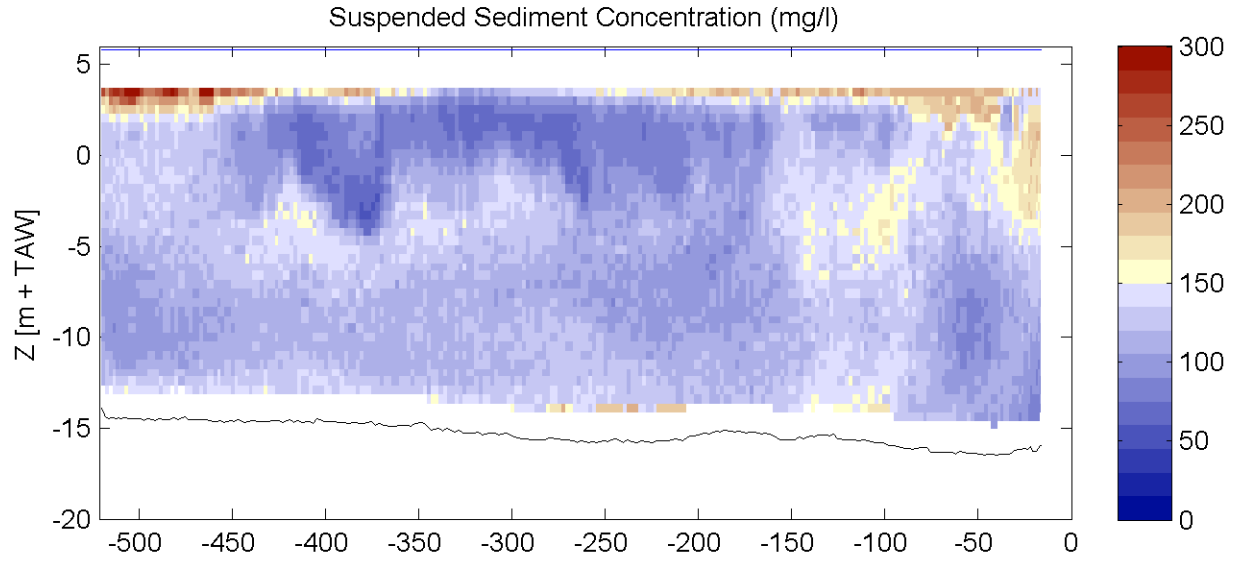
Data Processed by: IMDC

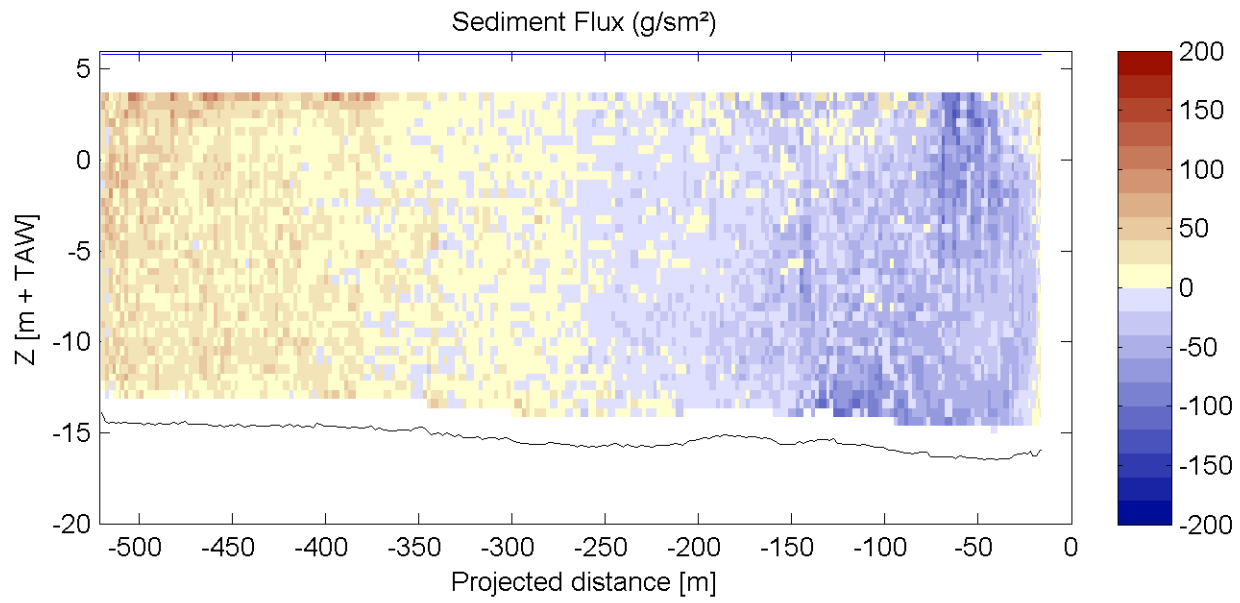
In association with : w.l | delft hydraulics, GEMS International

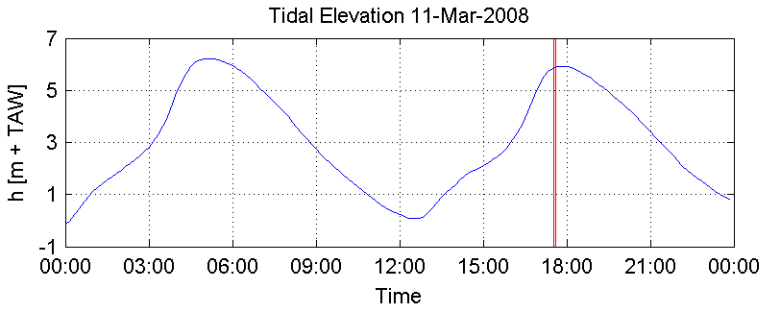
I/RA/11283/07.090/MSA

# Through Tide Sediview Measurement Spring tide 11/03/2008

| | |
|---|---|
| 11283 - Aanslibbing Deurganckdok | Equipment(s): ADCP |
| Sourcefile: 3087DGDt_sub.csv | Location: Transect DGD |




HW/LW:
05:00: h = 6.22 m+TAW
12:30: h = 0.08 m+TAW
17:50: h = 5.93 m+TAW

Date / Time [MET] :

11-Mar-2008

17:31 - 17:35

Time after HW [HH:MM]

-0:16

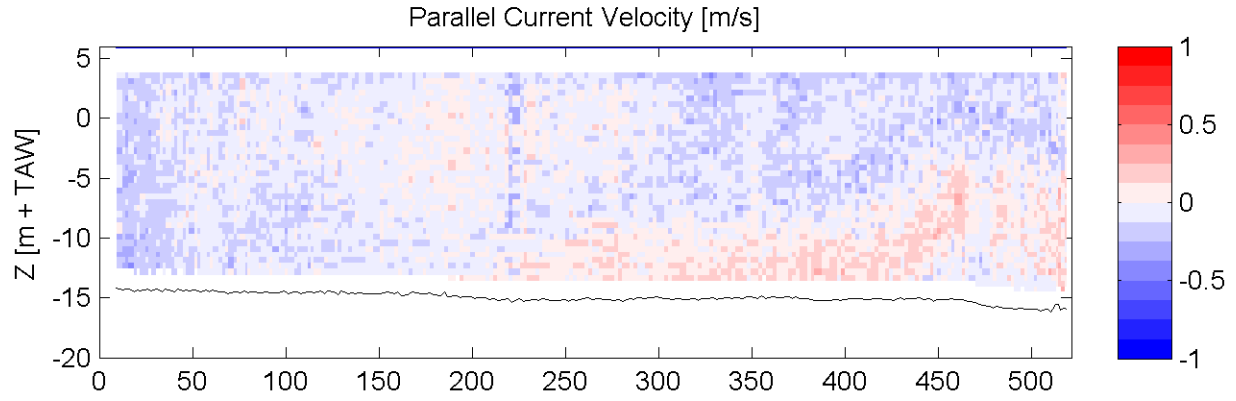
Data Processed by: IMDC

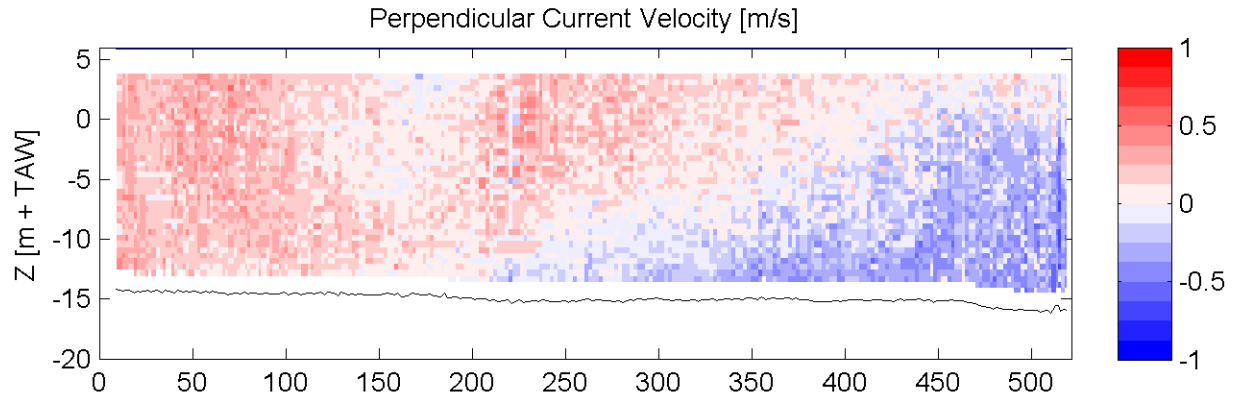
In association with : WL | delft hydraulics, GEMS International

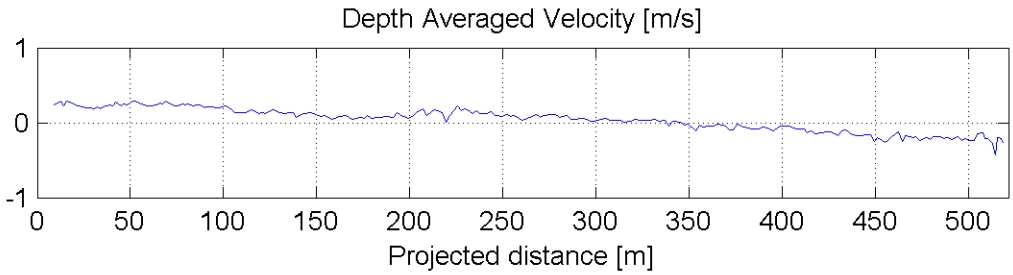
I/RA/11283/07.090/MSA

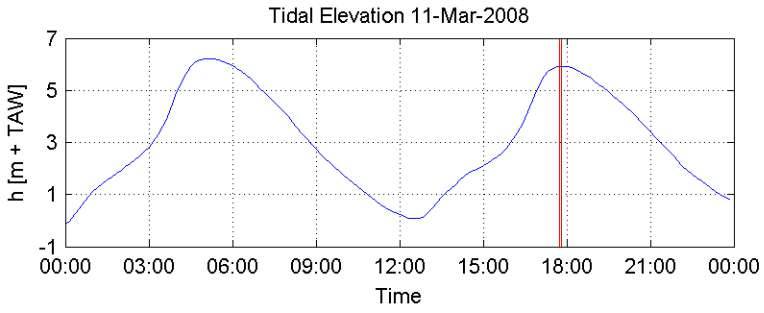
# Through Tide Sediview Measurement Spring tide 11/03/2008

| | |
|---|---|
| 11283 - Aanslibbing Deurganckdok | Equipment(s): ADCP |
| Sourcefile: 3089DGDs_sub.csv | Location: Transect DGD |




HW/LW:
05:00: h = 6.22 m+TAW
12:30: h = 0.08 m+TAW
17:50: h = 5.93 m+TAW

Date / Time [MET] :

11-Mar-2008

17:43 - 17:48

Time after HW [HH:MM]

-0:04

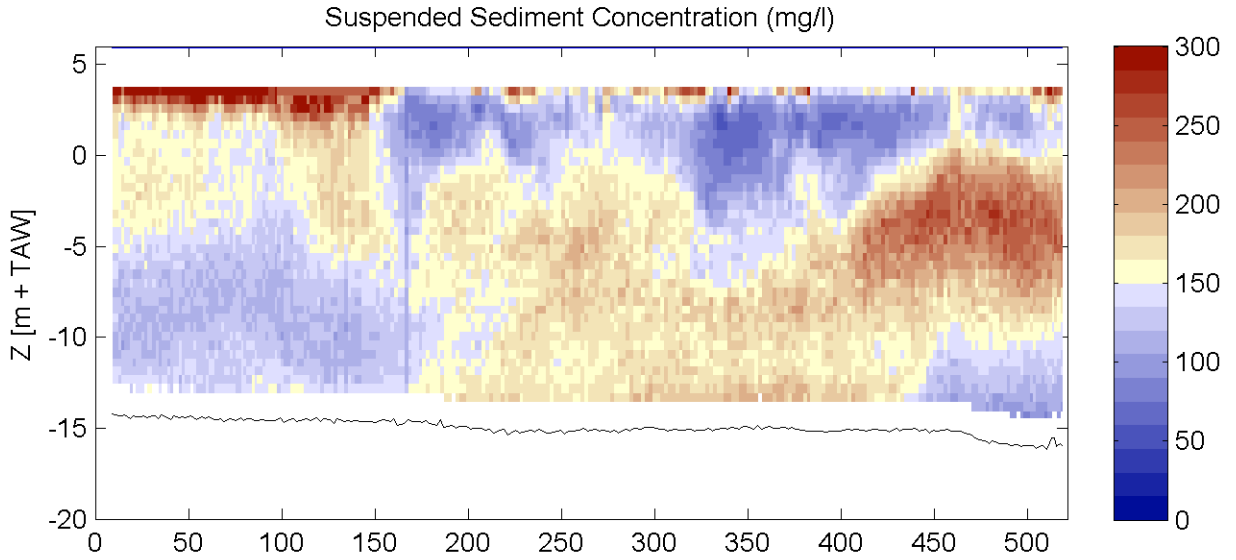
Data Processed by: IMDC

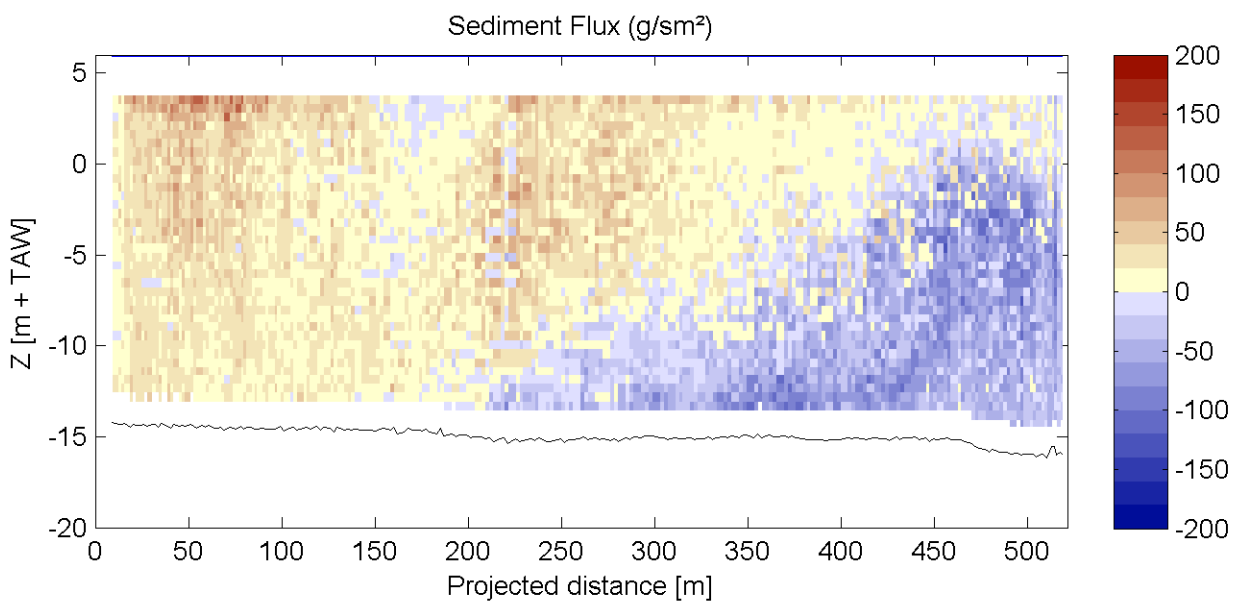
In association with : w.l | delft hydraulics, GEMS International

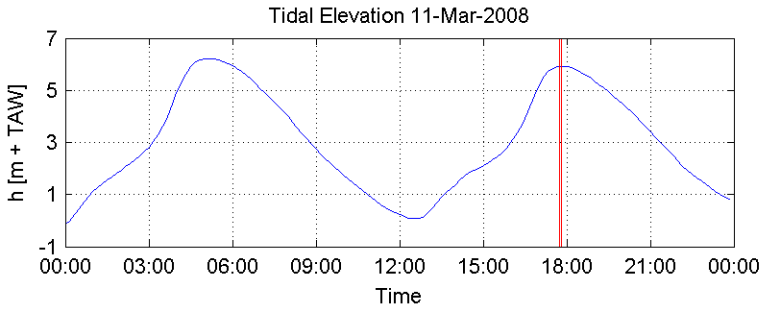
I/RA/11283/07.090/MSA

# Through Tide Sediview Measurement Spring tide 11/03/2008

| | |
|---|---|
| 11283 - Aanslibbing Deurganckdok | Equipment(s): ADCP |
| Sourcefile: 3089DGDs_sub.csv | Location: Transect DGD |




HW/LW:
05:00: h = 6.22 m+TAW
12:30: h = 0.08 m+TAW
17:50: h = 5.93 m+TAW

Date / Time [MET] :

11-Mar-2008

17:43 - 17:48

Time after HW [HH:MM]

-0:04

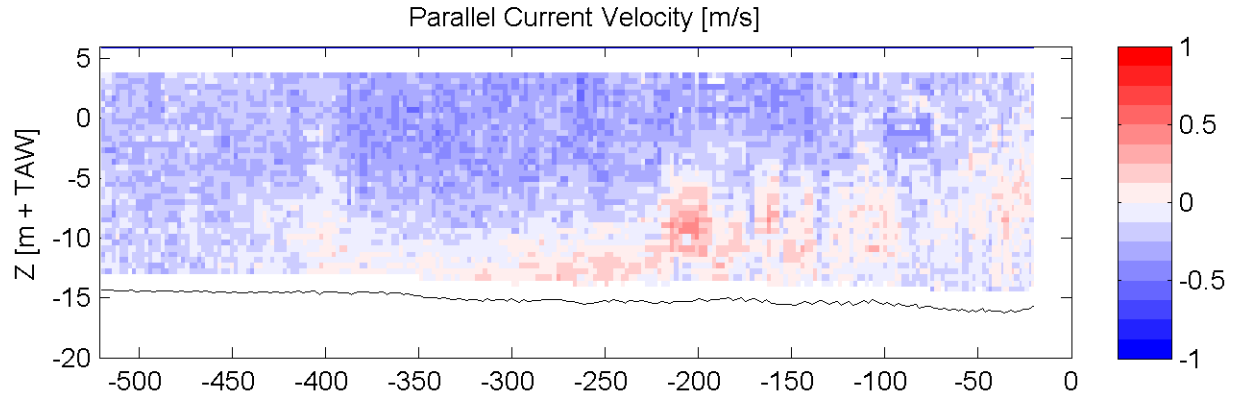
Data Processed by: IMDC

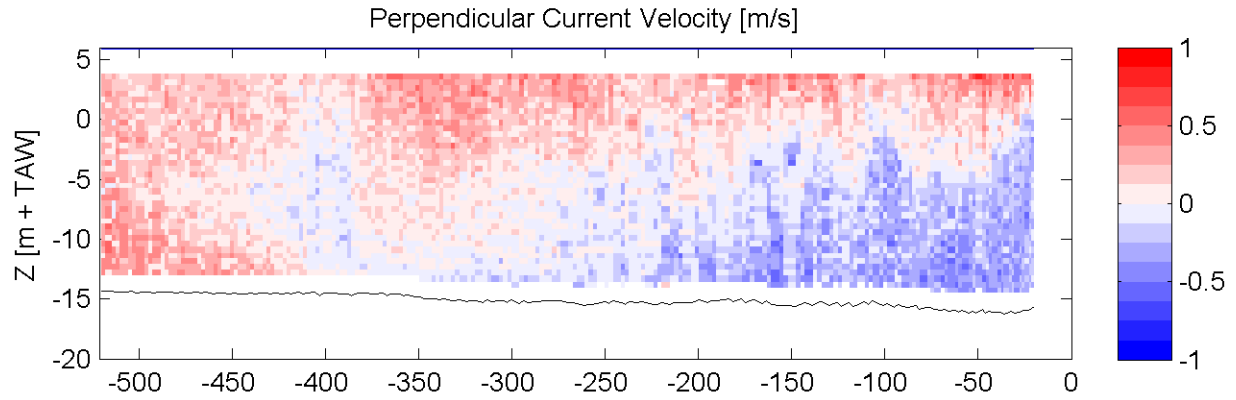
In association with : WL | delft hydraulics, GEMS International

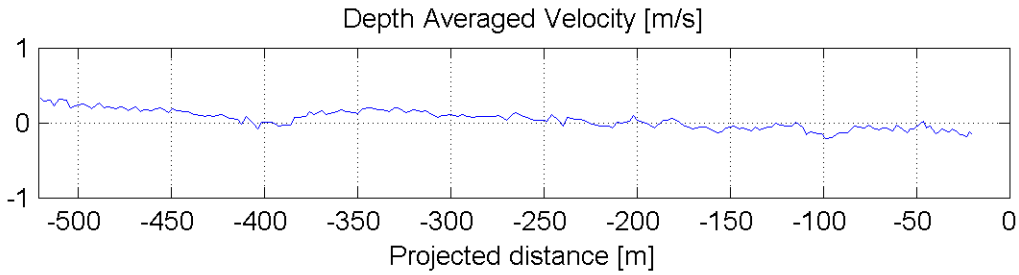
I/RA/11283/07.090/MSA

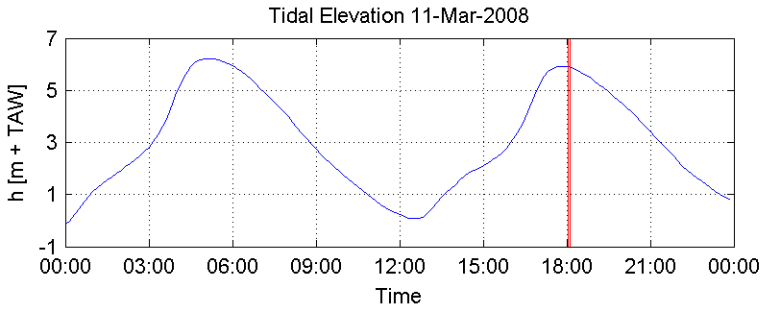
# Through Tide Sediview Measurement Spring tide 11/03/2008

| | |
|---|---|
| 11283 - Aanslibbing Deurganckdok | Equipment(s): ADCP |
| Sourcefile: 3091DGDt_sub.csv | Location: Transect DGD |




HW/LW:
05:00: h = 6.22 m+TAW
12:30: h = 0.08 m+TAW
17:50: h = 5.93 m+TAW

Date / Time [MET] :

11-Mar-2008

18:02 - 18:06

Time after HW [HH:MM]

0:14

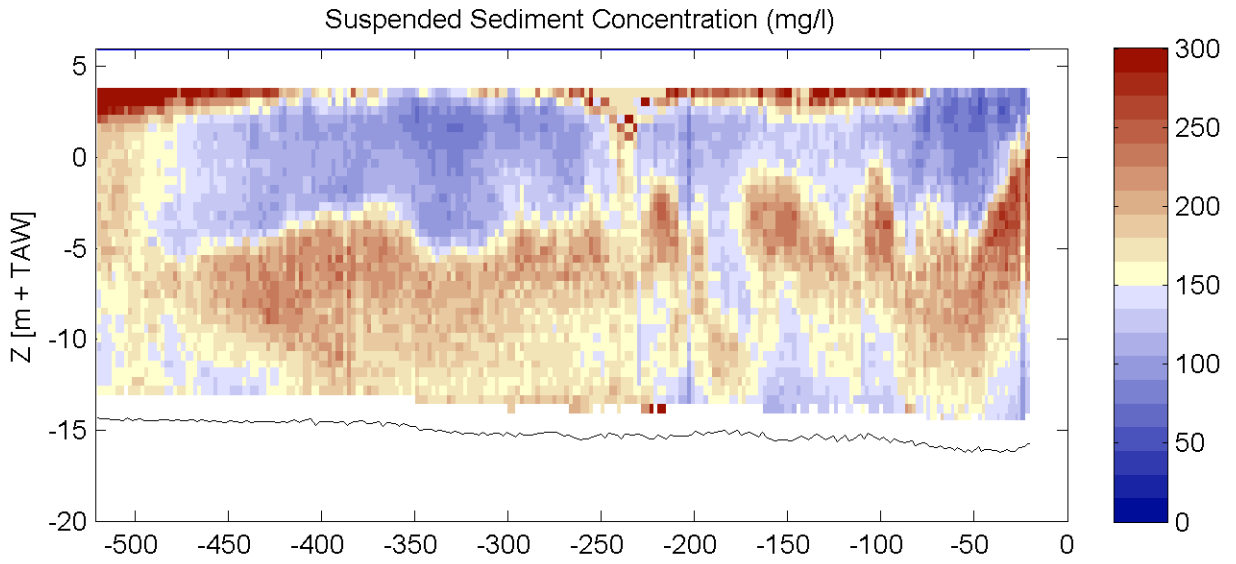
Data Processed by: IMDC

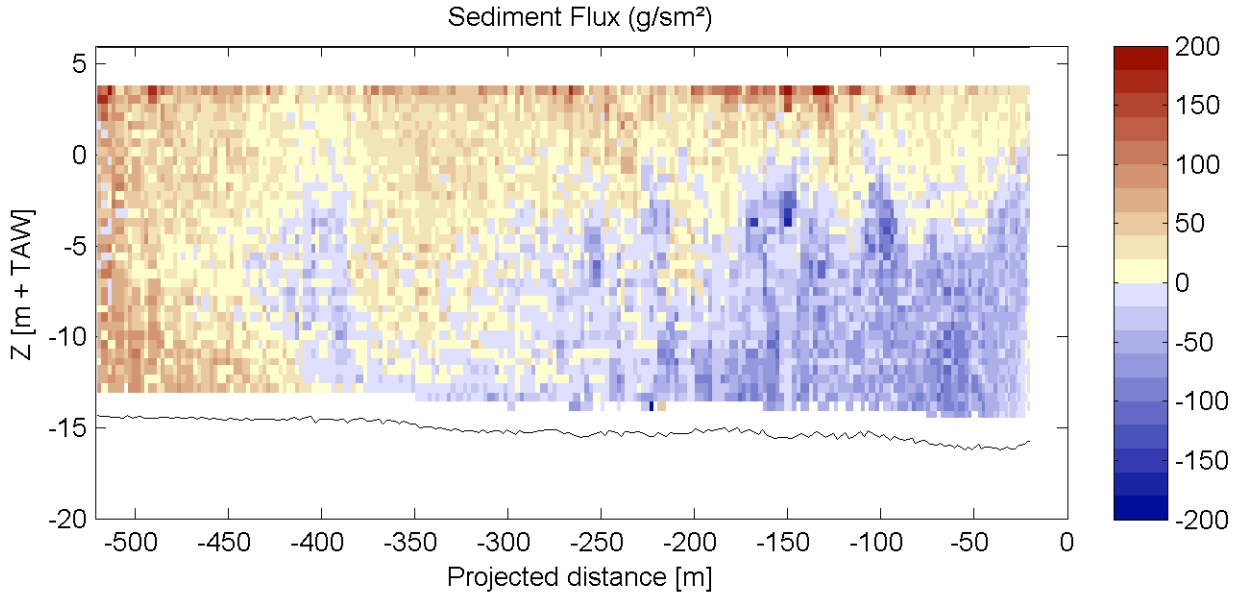
In association with : w.l | delft hydraulics, GEMS International

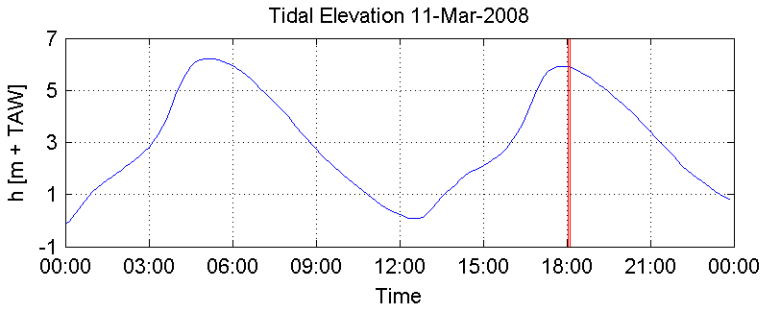
I/RA/11283/07.090/MSA

# Through Tide Sediview Measurement Spring tide 11/03/2008

| | |
|---|---|
| 11283 - Aanslibbing Deurganckdok | Equipment(s): ADCP |
| Sourcefile: 3091DGDt_sub.csv | Location: Transect DGD |




HW/LW: 05:00: h = 6.22 m+TAW
12:30: h = 0.08 m+TAW
17:50: h = 5.93 m+TAW

Date / Time [MET] :

11-Mar-2008

18:02 - 18:06

Time after HW [HH:MM]

0:14

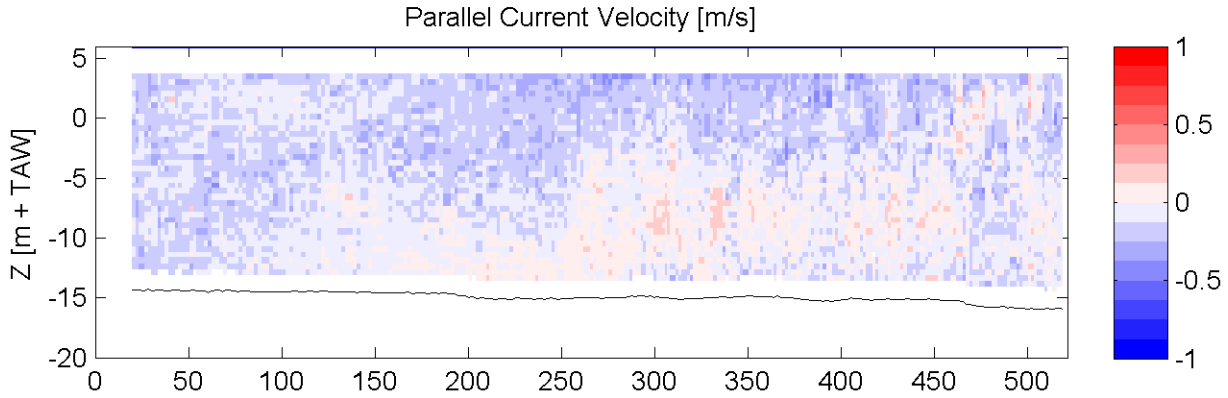
Data Processed by: IMDC

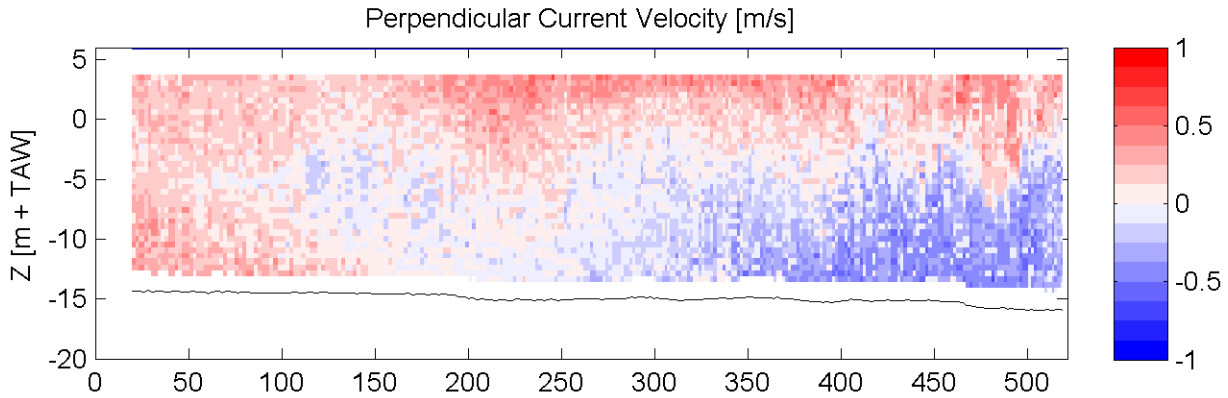
In association with : WL | delft hydraulics, GEMS International

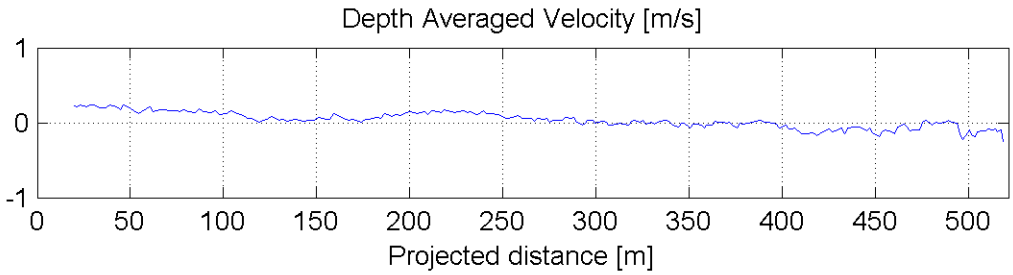
I/RA/11283/07.090/MSA

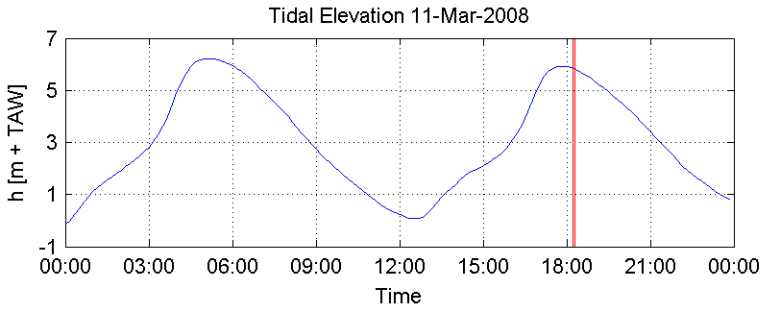
# Through Tide Sediview Measurement Spring tide 11/03/2008

| | |
|---|---|
| 11283 - Aanslibbing Deurganckdok | Equipment(s): ADCP |
| Sourcefile: 3093DGDs_sub.csv | Location: Transect DGD |




HW/LW:
05:00: h = 6.22 m+TAW
12:30: h = 0.08 m+TAW
17:50: h = 5.93 m+TAW

Date / Time [MET] :

11-Mar-2008

18:13 - 18:18

Time after HW [HH:MM]

0:25

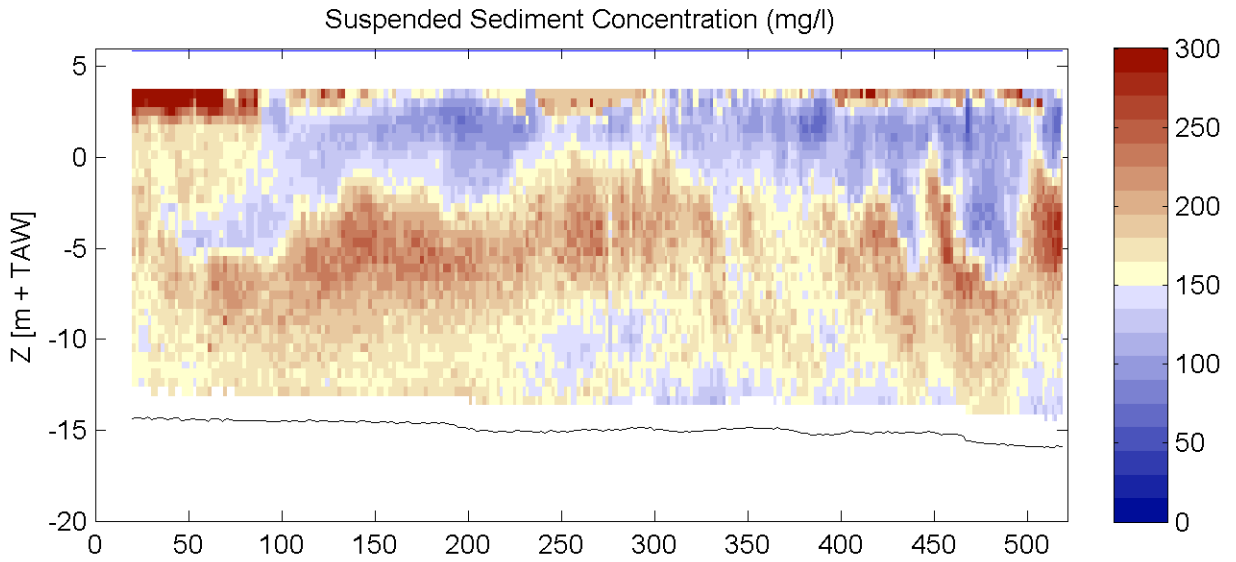
Data Processed by: IMDC

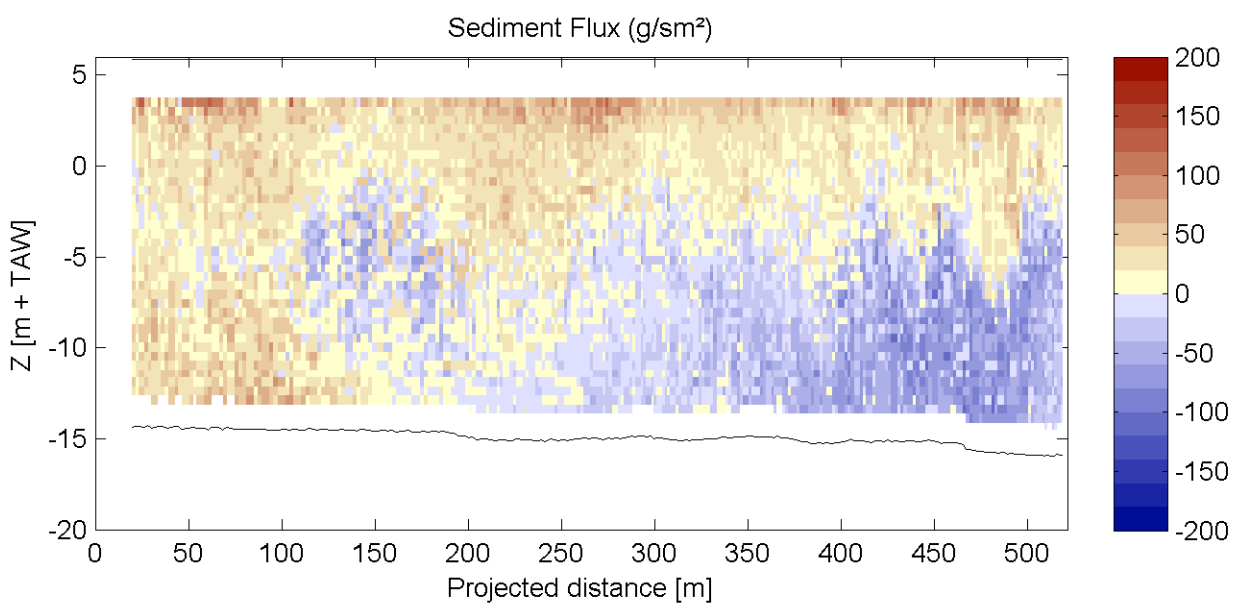
In association with : WL | delft hydraulics, GEMS International

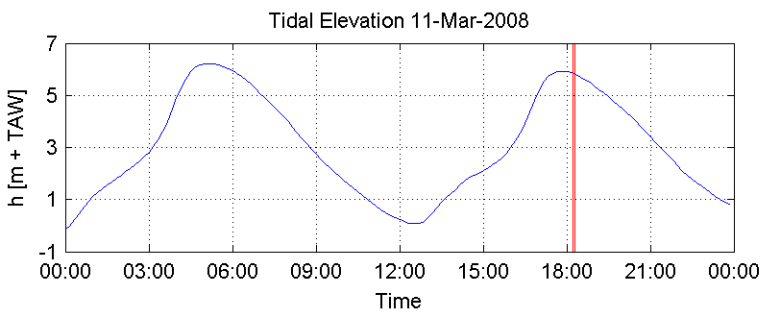
I/RA/11283/07.090/MSA

# Through Tide Sediview Measurement Spring tide 11/03/2008

| | |
|---|---|
| 11283 - Aanslibbing Deurganckdok | Equipment(s): ADCP |
| Sourcefile: 3093DGDs_sub.csv | Location: Transect DGD |




HW/LW:
05:00: h = 6.22 m+TAW
12:30: h = 0.08 m+TAW
17:50: h = 5.93 m+TAW

Date / Time [MET] :

11-Mar-2008

18:13 - 18:18

Time after HW [HH:MM]

0:25

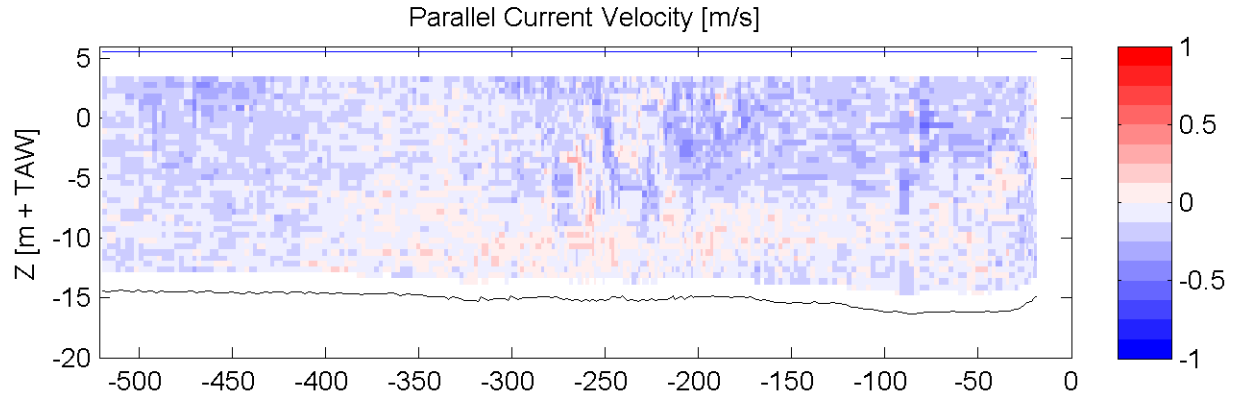
Data Processed by: IMDC

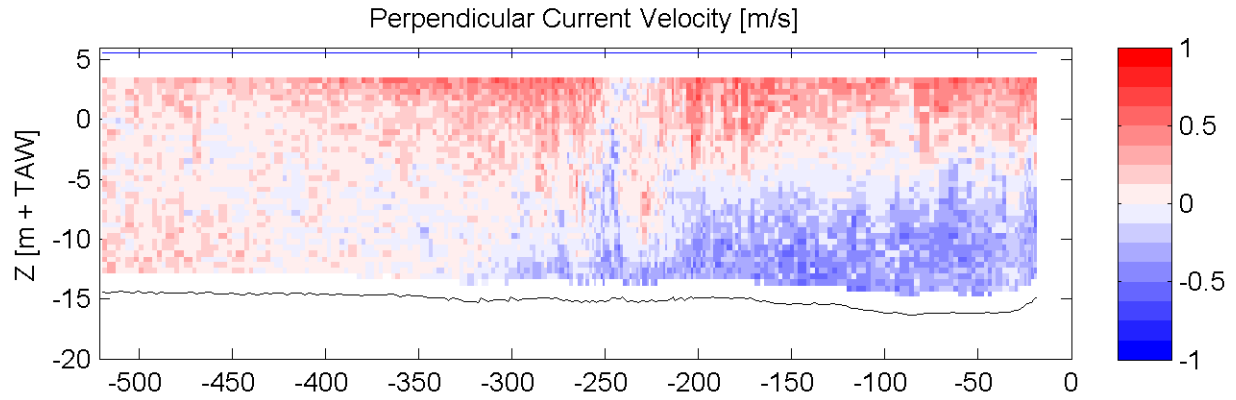
In association with : WL | delft hydraulics, GEMS International

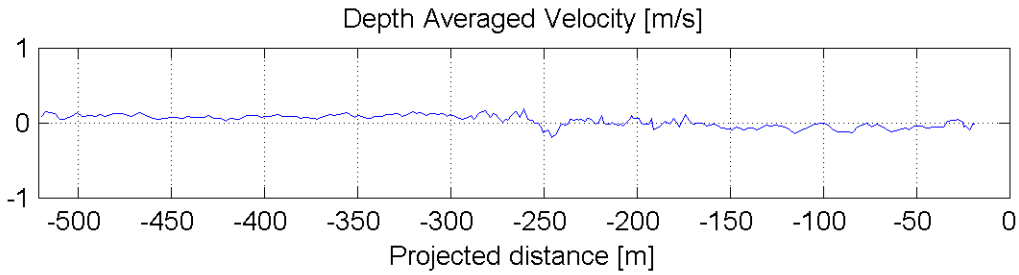
I/RA/11283/07.090/MSA

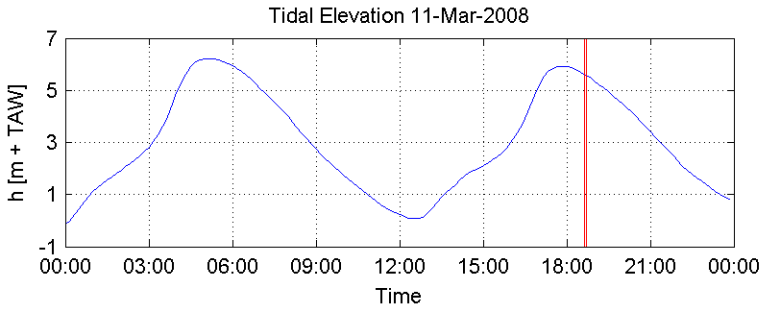
# Through Tide Sediview Measurement Spring tide 11/03/2008

| | |
|---|---|
| 11283 - Aanslibbing Deurganckdok | Equipment(s): ADCP |
| Sourcefile: 3095DGDt_sub.csv | Location: Transect DGD |




HW/LW:
05:00: h = 6.22 m+TAW
12:30: h = 0.08 m+TAW
17:50: h = 5.93 m+TAW

Date / Time [MET] :

11-Mar-2008

18:37 - 18:42

Time after HW [HH:MM]

0:49

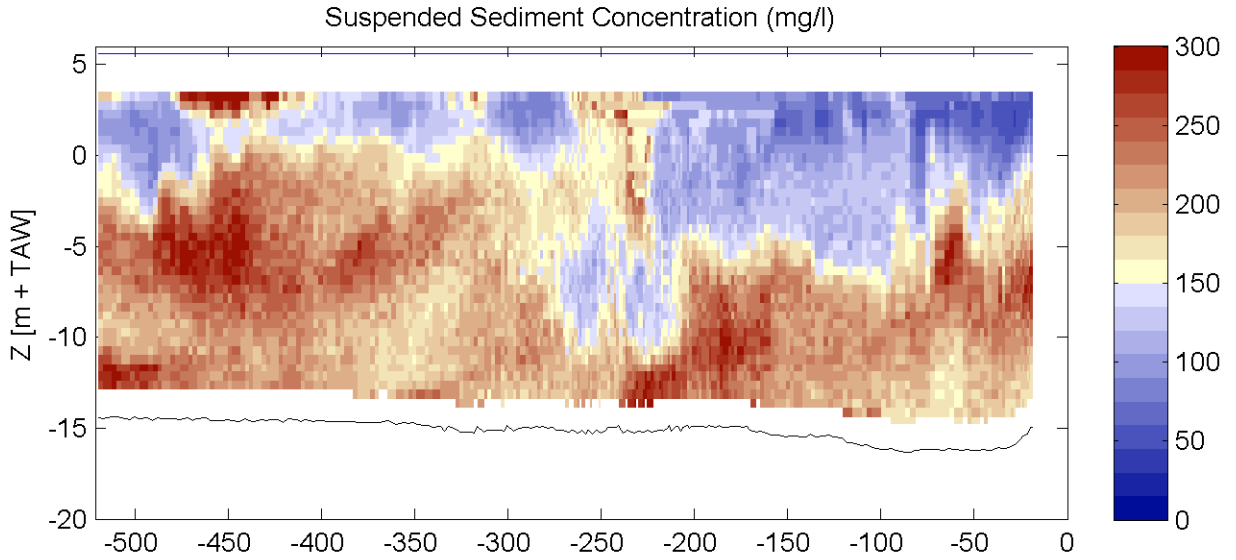
Data Processed by: IMDC

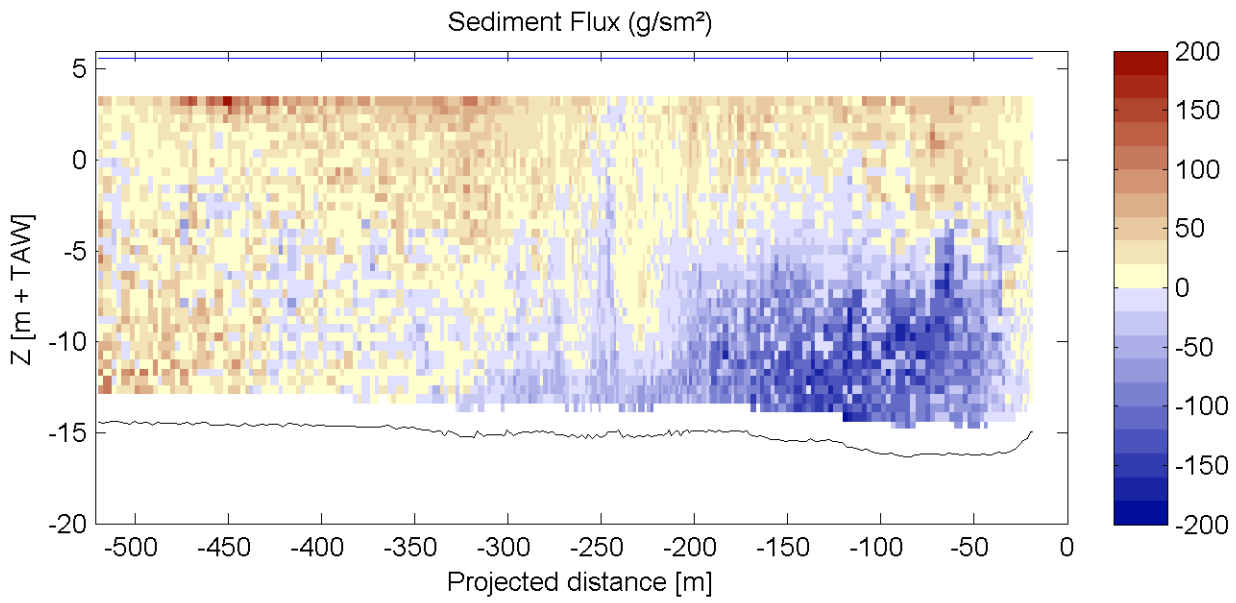
In association with : w.l | delft hydraulics, GEMS International

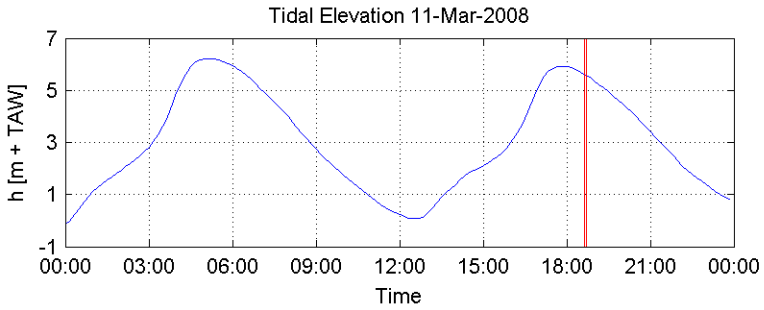
I/RA/11283/07.090/MSA

# Through Tide Sediview Measurement Spring tide 11/03/2008

| | |
|---|---|
| 11283 - Aanslibbing Deurganckdok | Equipment(s): ADCP |
| Sourcefile: 3095DGDt_sub.csv | Location: Transect DGD |




HW/LW:
05:00: h = 6.22 m+TAW
12:30: h = 0.08 m+TAW
17:50: h = 5.93 m+TAW

Date / Time [MET] :

11-Mar-2008

18:37 - 18:42

Time after HW [HH:MM]

0:49

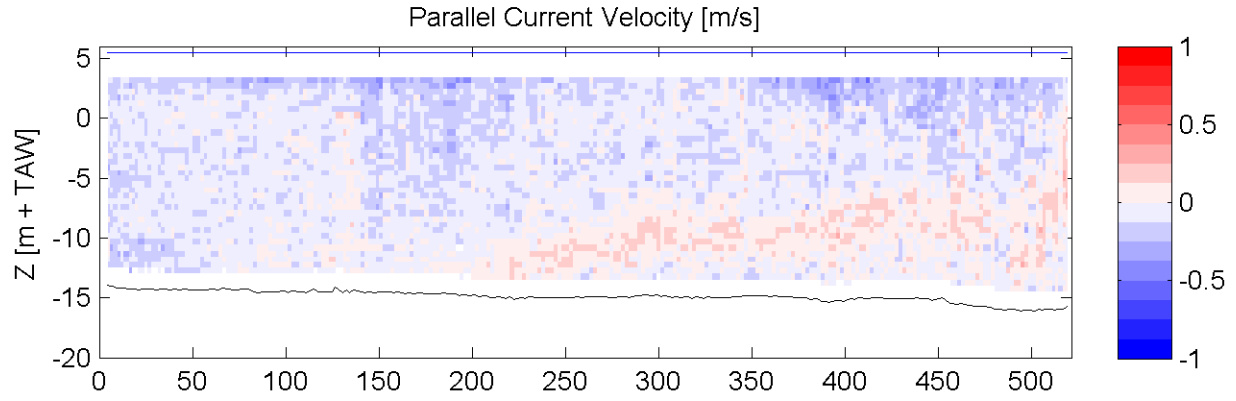
Data Processed by: IMDC

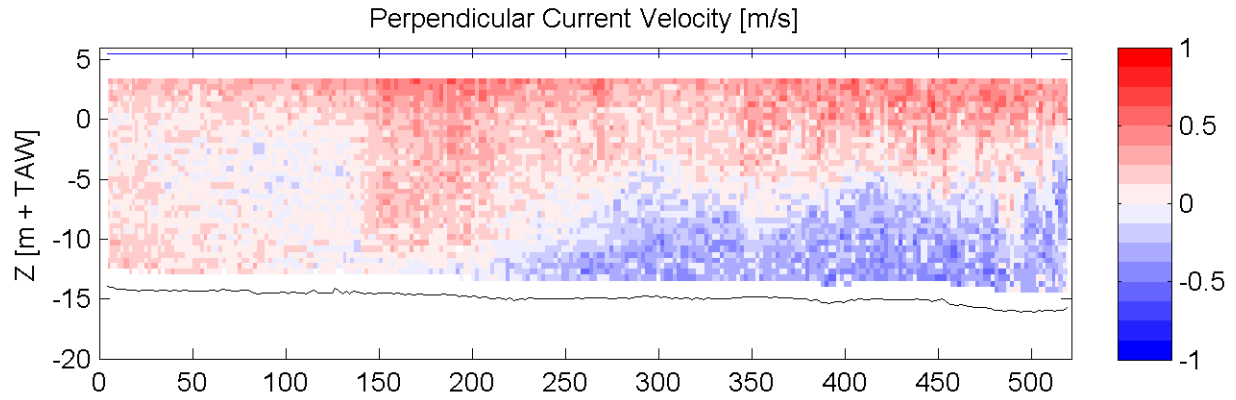
In association with : WL | delft hydraulics, GEMS International

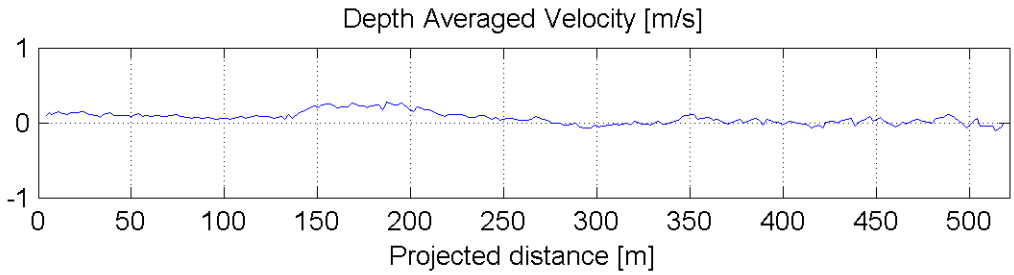
I/RA/11283/07.090/MSA

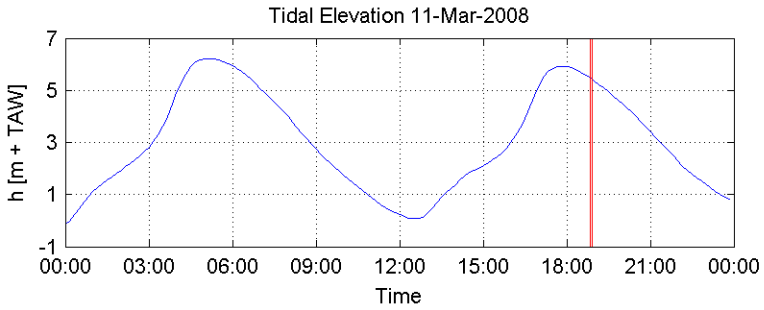
# Through Tide Sediview Measurement Spring tide 11/03/2008

| | |
|---|---|
| 11283 - Aanslibbing Deurganckdok | Equipment(s): ADCP |
| Sourcefile: 3097DGDt_sub.csv | Location: Transect DGD |




HW/LW: 05:00: h = 6.22 m+TAW
12:30: h = 0.08 m+TAW
17:50: h = 5.93 m+TAW

Date / Time [MET] :

11-Mar-2008

18:50 - 18:55

Time after HW [HH:MM]

1:03

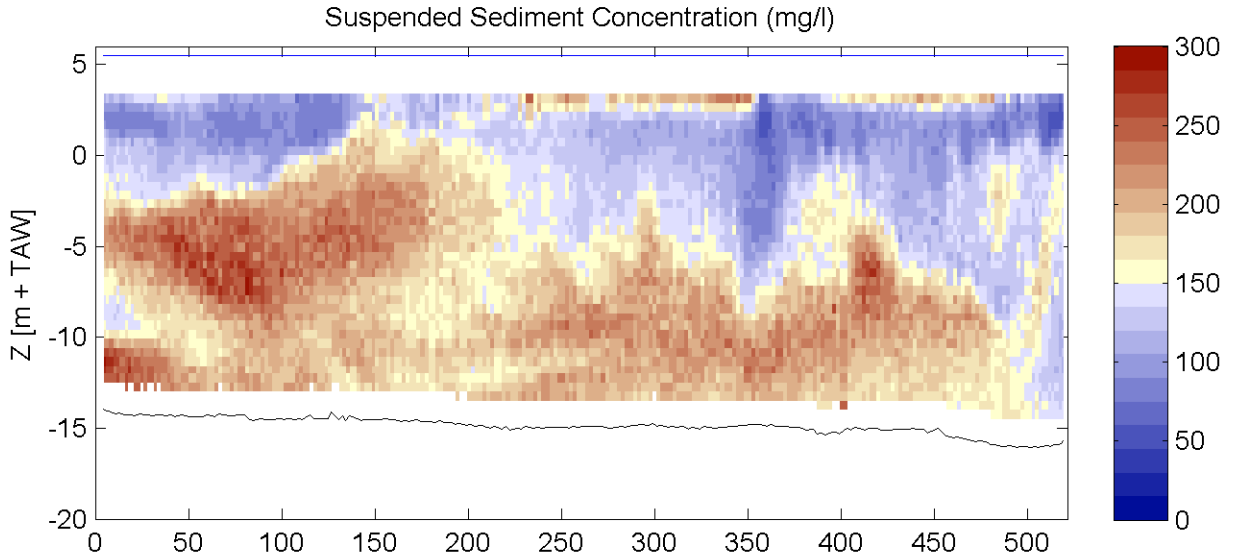
Data Processed by: IMDC

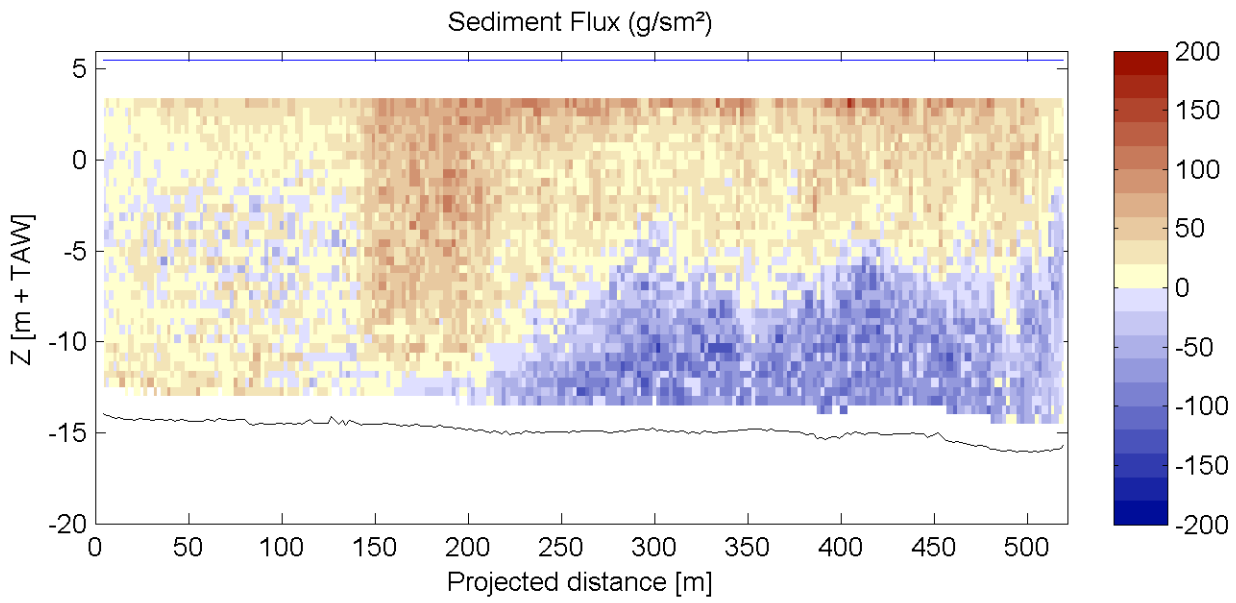
In association with : w.l | delft hydraulics, GEMS International

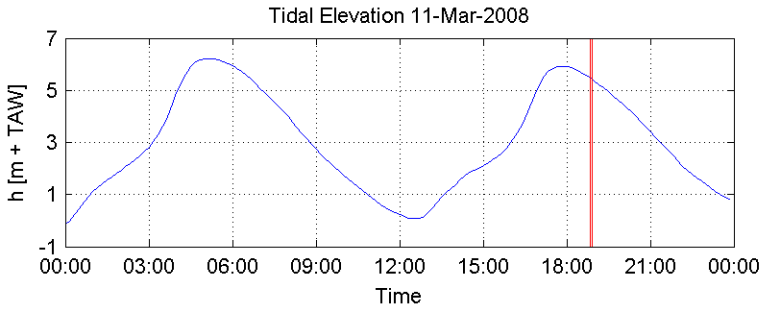
I/RA/11283/07.090/MSA

# Through Tide Sediview Measurement Spring tide 11/03/2008

| | |
|---|---|
| 11283 - Aanslibbing Deurganckdok | Equipment(s): ADCP |
| Sourcefile: 3097DGDt_sub.csv | Location: Transect DGD |




HW/LW:
05:00: h = 6.22 m+TAW
12:30: h = 0.08 m+TAW
17:50: h = 5.93 m+TAW

Date / Time [MET] :

11-Mar-2008

18:50 - 18:55

Time after HW [HH:MM]

1:03

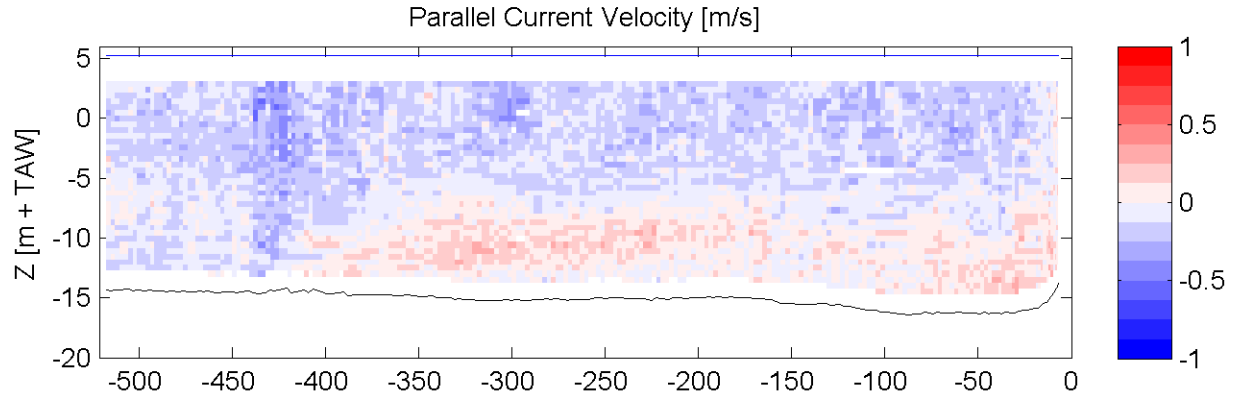
Data Processed by: IMDC

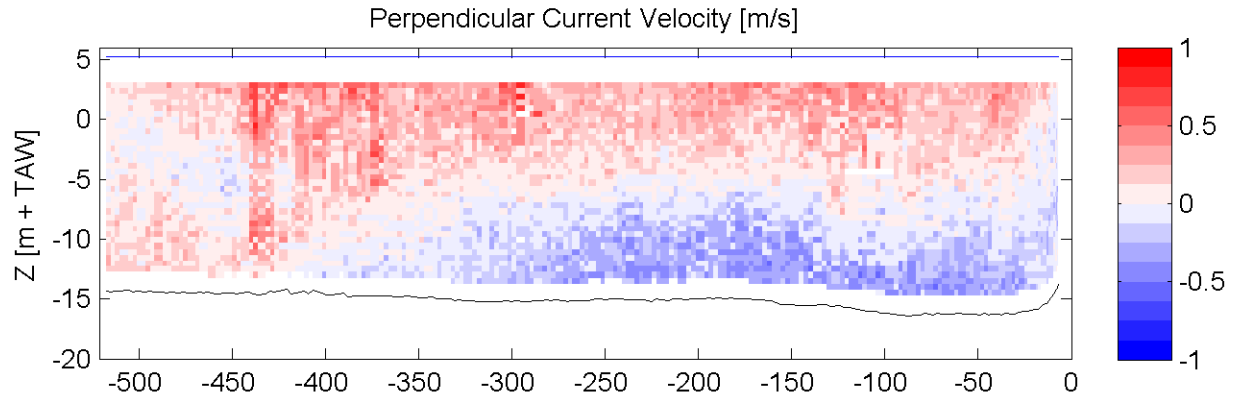
In association with : WL | delft hydraulics, GEMS International

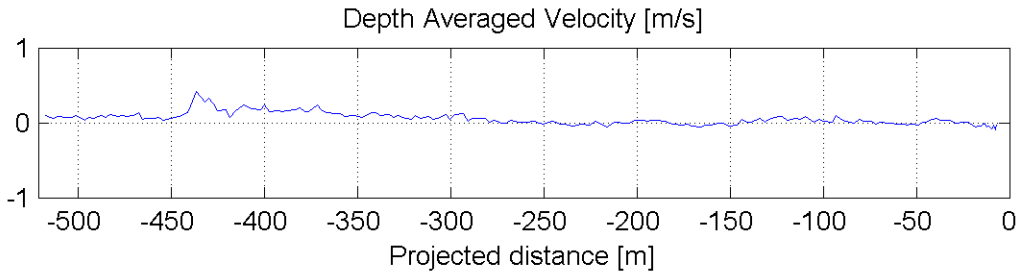
I/RA/11283/07.090/MSA

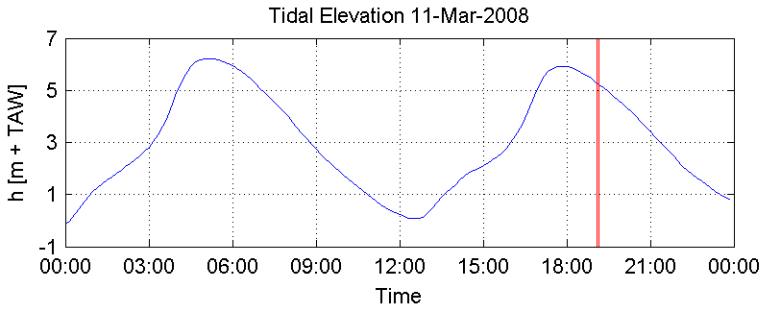
# Through Tide Sediview Measurement Spring tide 11/03/2008

| | |
|---|---|
| 11283 - Aanslibbing Deurganckdok | Equipment(s): ADCP |
| Sourcefile: 3099DGDt_sub.csv | Location: Transect DGD |




HW/LW: 05:00: h = 6.22 m+TAW
12:30: h = 0.08 m+TAW
17:50: h = 5.93 m+TAW

Date / Time [MET] :

11-Mar-2008

19:05 - 19:09

Time after HW [HH:MM]

1:17

Data Processed by: IMDC

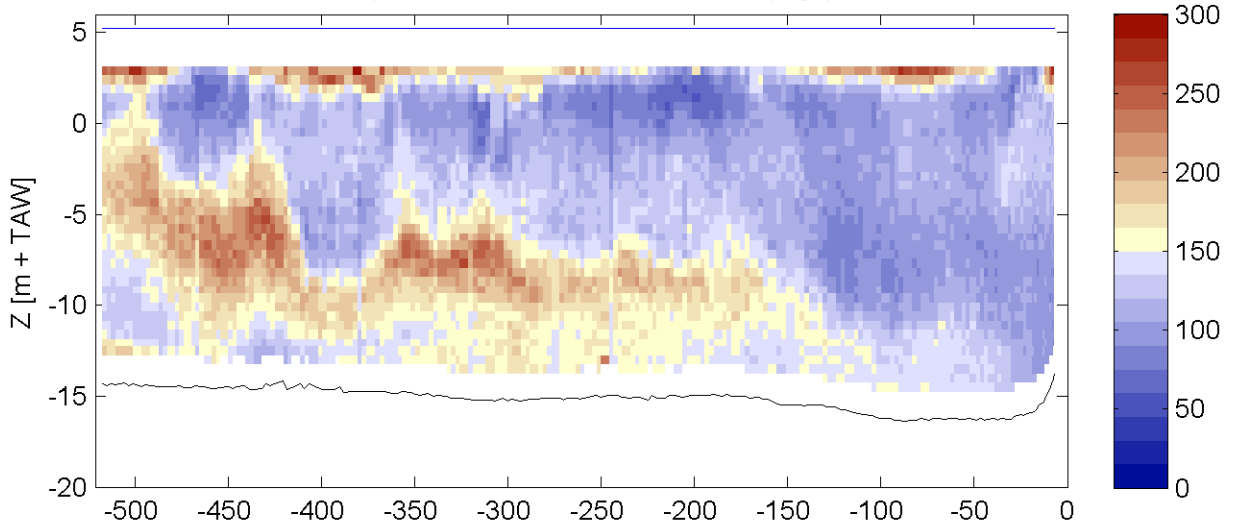
In association with : WL | delft hydraulics, GEMS International

I/RA/11283/07.090/MSA

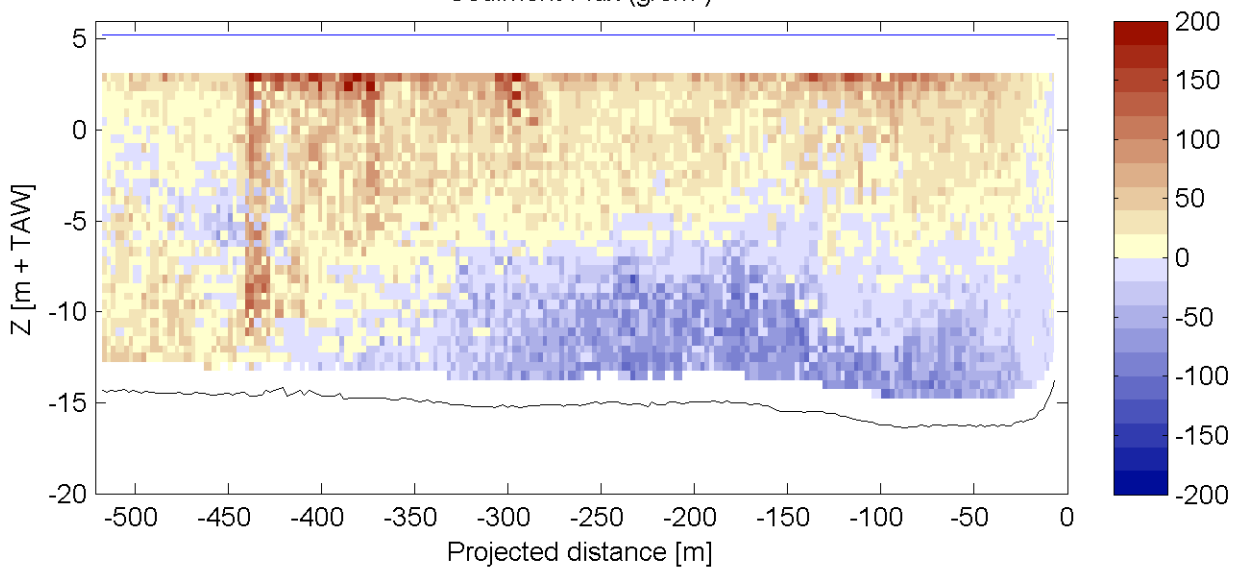
# Through Tide Sediview Measurement Spring tide 11/03/2008

| | |
|---|---|
| 11283 - Aanslibbing Deurganckdok | Equipment(s): ADCP |
| Sourcefile: 3099DGDt_sub.csv | Location: Transect DGD |

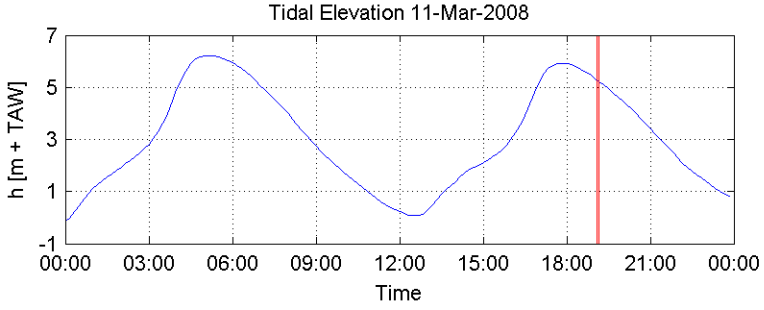
Suspended Sediment Concentration (mg/l)




Sediment Flux (g/sm²)




Tidal Elevation 11-Mar-2008




HW/LW:
05:00: h = 6.22 m+TAW
12:30: h = 0.08 m+TAW
17:50: h = 5.93 m+TAW

Date / Time [MET] :
11-Mar-2008
19:05 - 19:09

Time after HW [HH:MM]
1:17

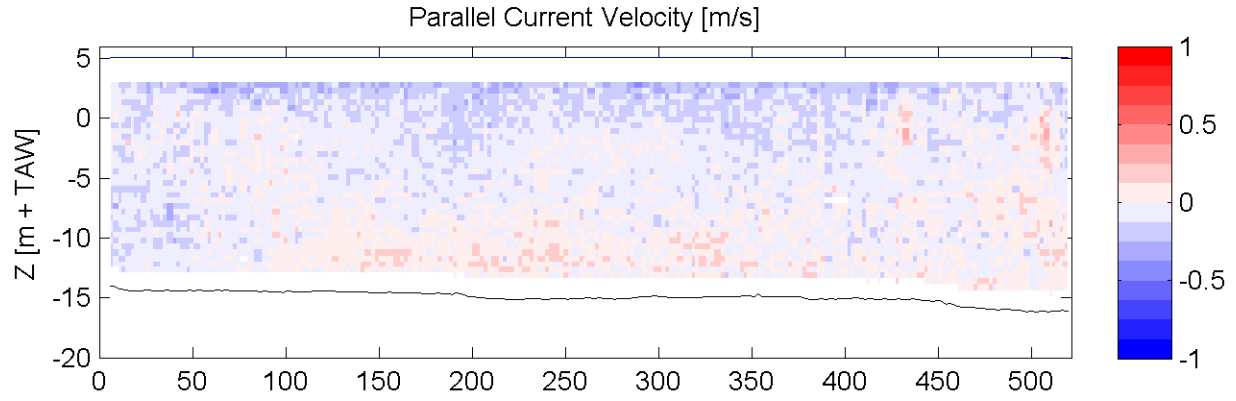
Data Processed by: IMDC

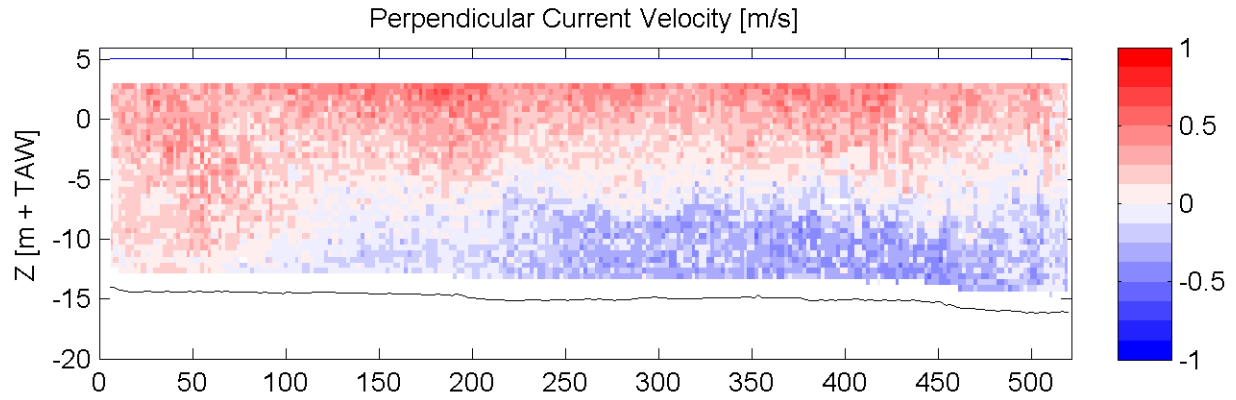
In association with : w.l | delft hydraulics, GEMS International

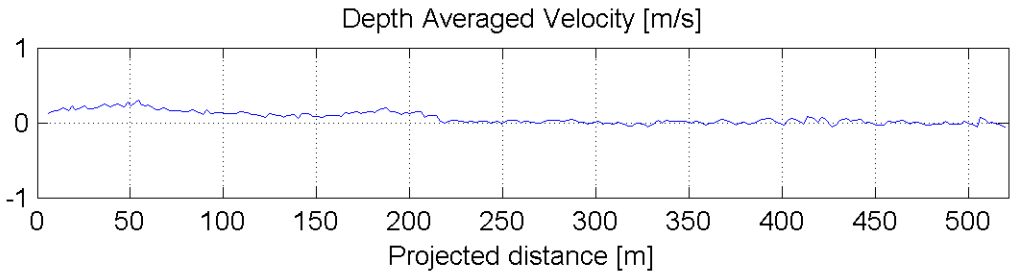
I/RA/11283/07.090/MSA

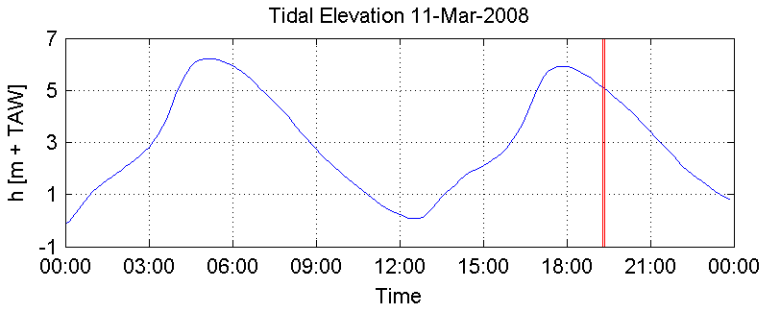
# Through Tide Sediview Measurement Spring tide 11/03/2008

| | |
|---|---|
| 11283 - Aanslibbing Deurganckdok | Equipment(s): ADCP |
| Sourcefile: 3101DGDs_sub.csv | Location: Transect DGD |




HW/LW: 05:00: h = 6.22 m+TAW
12:30: h = 0.08 m+TAW
17:50: h = 5.93 m+TAW

Date / Time [MET] :

11-Mar-2008

19:17 - 19:22

Time after HW [HH:MM]

1:30

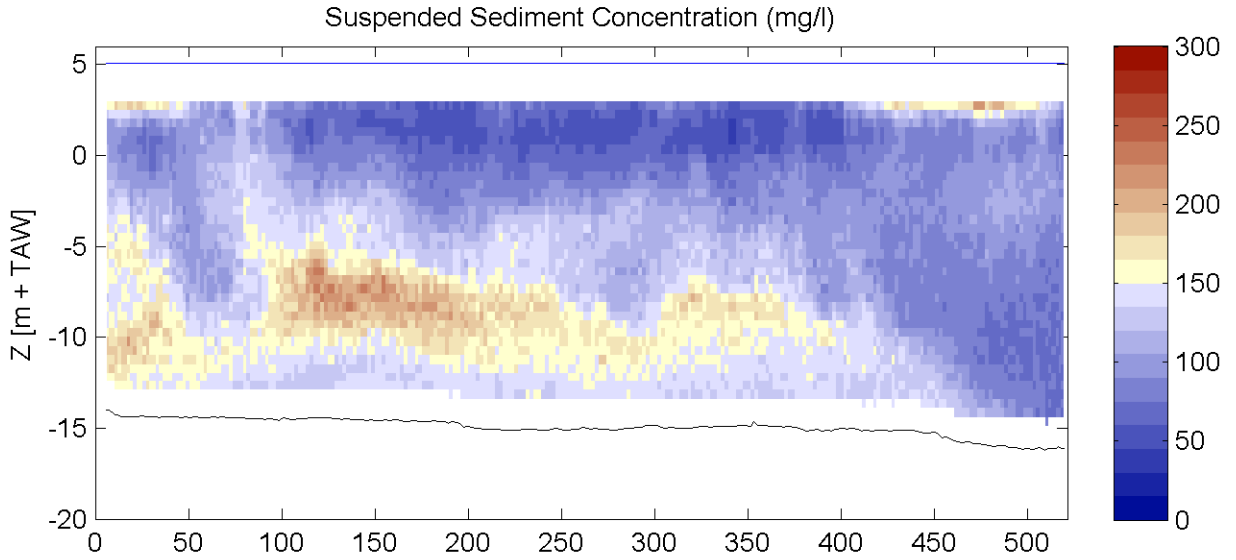
Data Processed by: IMDC

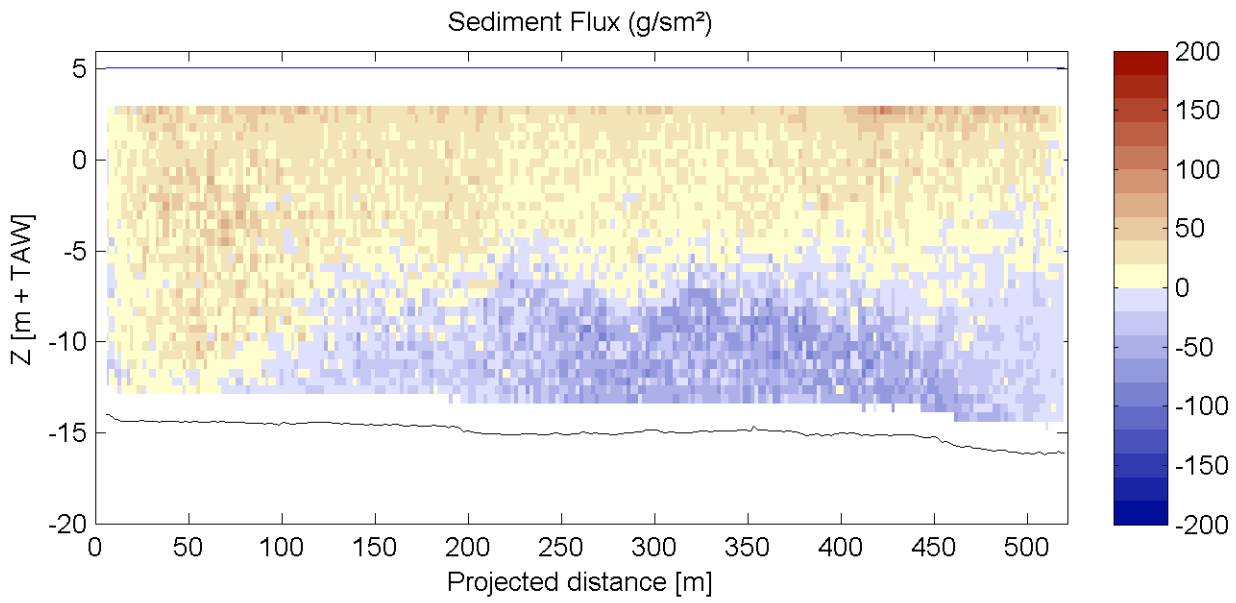
In association with : w.l | delft hydraulics, GEMS International

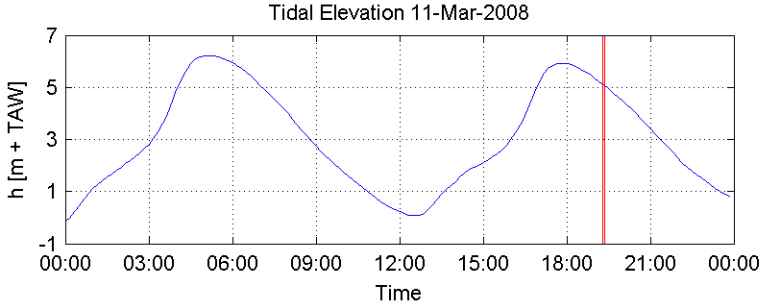
I/RA/11283/07.090/MSA

# Through Tide Sediview Measurement Spring tide 11/03/2008

| | |
|---|---|
| 11283 - Aanslibbing Deurganckdok | Equipment(s): ADCP |
| Sourcefile: 3101DGDs_sub.csv | Location: Transect DGD |




HW/LW:
05:00: h = 6.22 m+TAW
12:30: h = 0.08 m+TAW
17:50: h = 5.93 m+TAW

Date / Time [MET] :

11-Mar-2008

19:17 - 19:22

Time after HW [HH:MM]

1:30

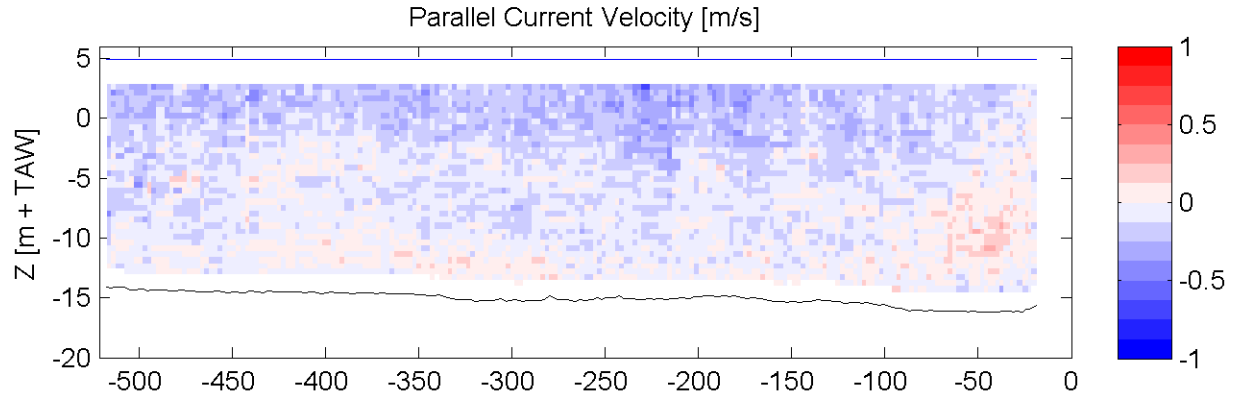
Data Processed by: IMDC

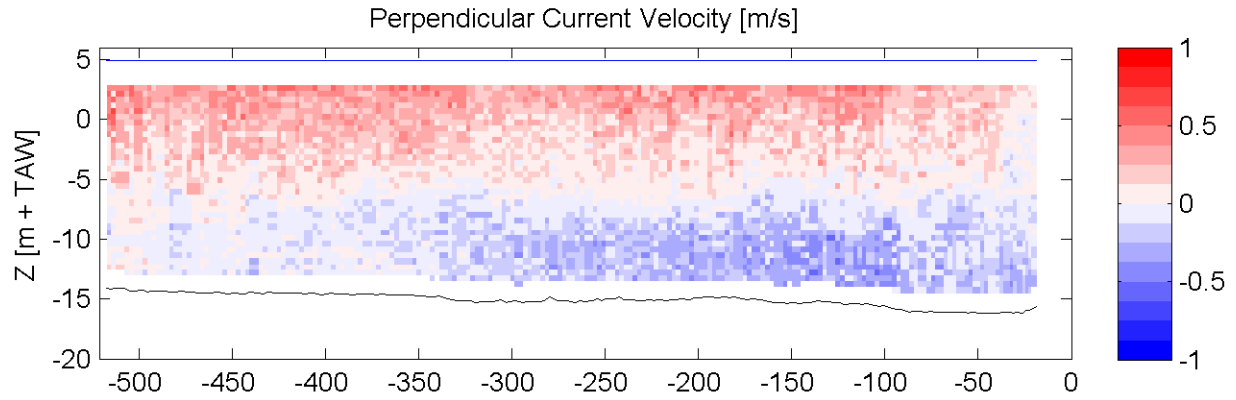
In association with : w.l | delft hydraulics, GEMS International

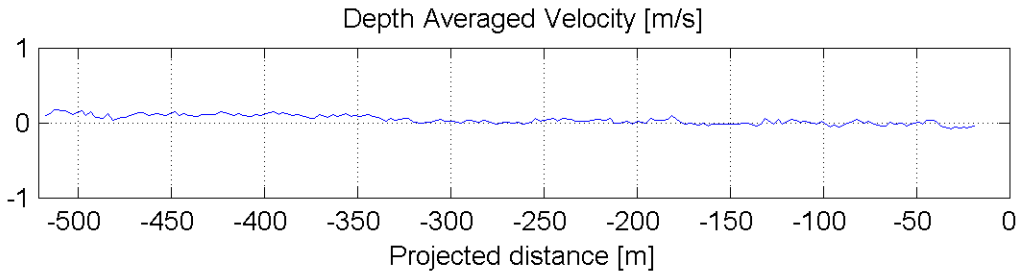
I/RA/11283/07.090/MSA

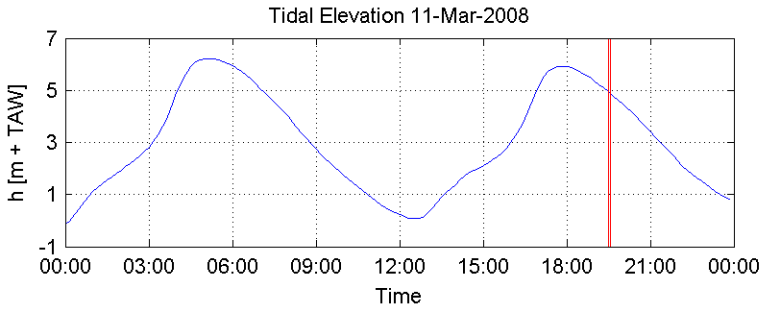
# Through Tide Sediview Measurement Spring tide 11/03/2008

| | |
|---|---|
| 11283 - Aanslibbing Deurganckdok | Equipment(s): ADCP |
| Sourcefile: 3103DGDt_sub.csv | Location: Transect DGD |




HW/LW:
05:00: h = 6.22 m+TAW
12:30: h = 0.08 m+TAW
17:50: h = 5.93 m+TAW

Date / Time [MET] :

11-Mar-2008

19:30 - 19:33

Time after HW [HH:MM]

1:41

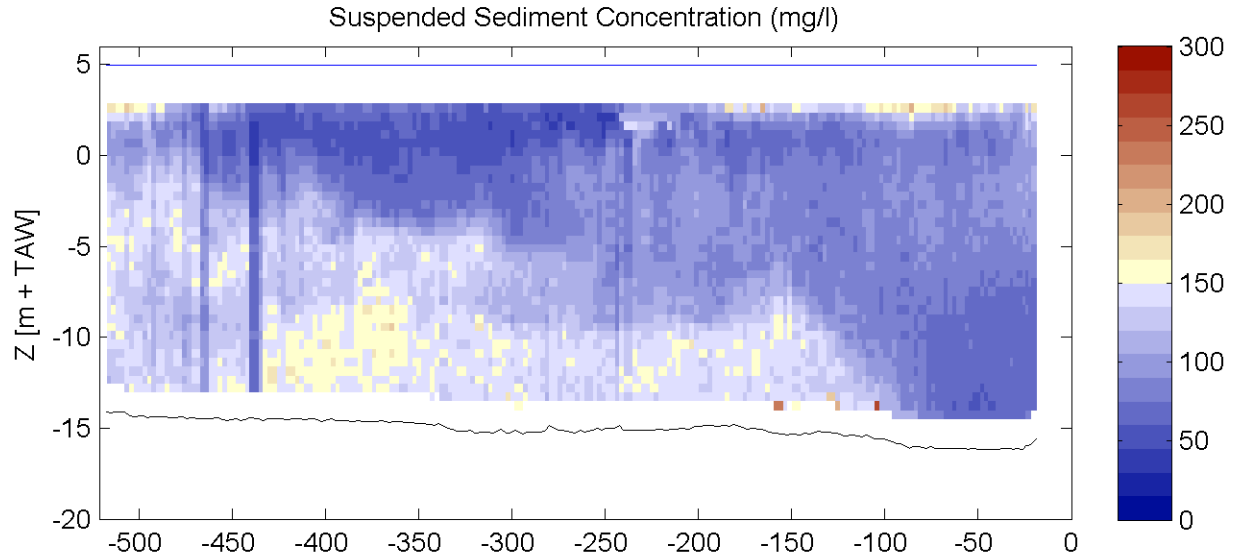
Data Processed by: IMDC

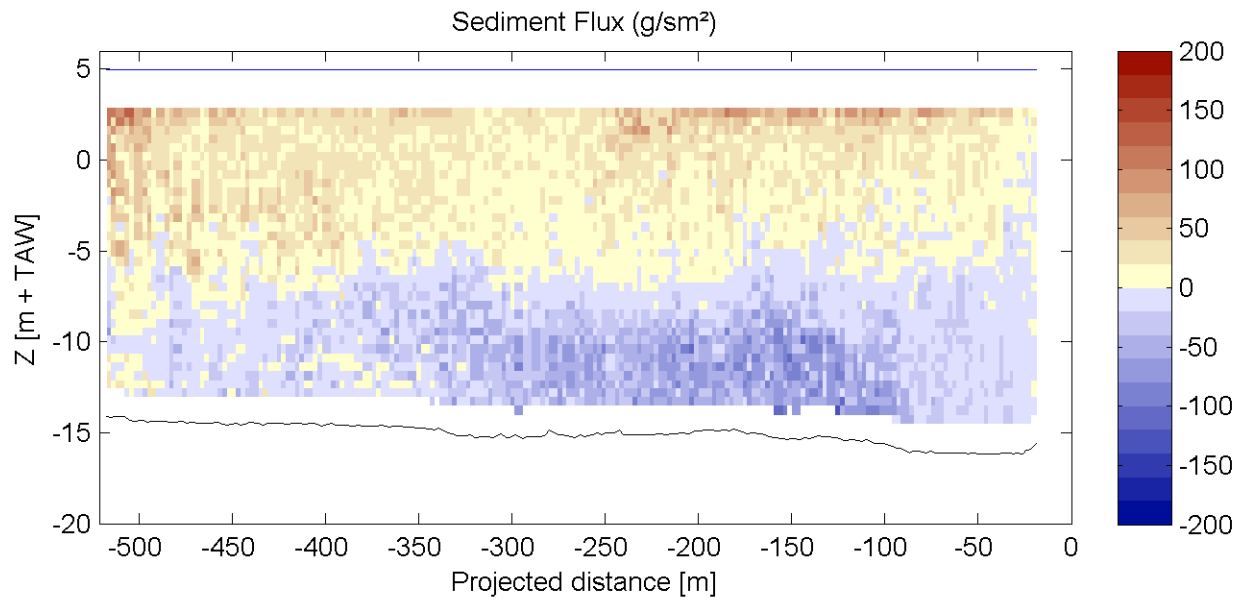
In association with : w.l | delft hydraulics, GEMS International

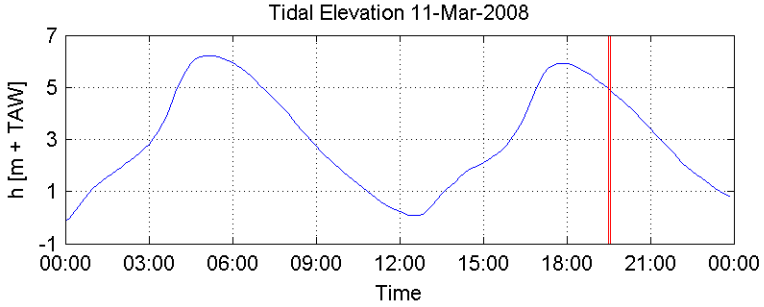
I/RA/11283/07.090/MSA

# Through Tide Sediview Measurement Spring tide 11/03/2008

| | |
|---|---|
| 11283 - Aanslibbing Deurganckdok | Equipment(s): ADCP |
| Sourcefile: 3103DGDt_sub.csv | Location: Transect DGD |




HW/LW:
05:00: h = 6.22 m+TAW
12:30: h = 0.08 m+TAW
17:50: h = 5.93 m+TAW

Date / Time [MET] :

11-Mar-2008

19:30 - 19:33

Time after HW [HH:MM]

1:41

Data Processed by: IMDC

In association with : WL | delft hydraulics, GEMS International

I/RA/11283/07.090/MSA

# APPENDIX H. DISCHARGE, CONCENTRATION AND SEDIMENT FLUX FOR THE TOTAL CROSS-SECTION

Discharge distribution over the cross section: positive is from dock to river

| *Filename* | *Time to HW [hh:mm]* | *Qmid [m³/s]* | *Qtop [m³/s]* | *Qbottom [m³/s]* | *Qleft [m³/s]* | *Qright [m³/s]* | *Qtotal [m³/s]* |
|---|---|---|---|---|---|---|---|
| 3003DGDt_sub.csv | 2:08 | 157 | 284 | 6 | 3 | 13 | 463 |
| 3005DGDs_sub.csv | 2:21 | 287 | 321 | 18 | -12 | 11 | 625 |
| 3007DGDt_sub.csv | 2:36 | 344 | 275 | 18 | 1 | -8 | 629 |
| 3009DGDs_sub.csv | 2:51 | 308 | 266 | 19 | 5 | 15 | 613 |
| 3011DGDt_sub.csv | 3:03 | 218 | 238 | 13 | -4 | 16 | 482 |
| 3013DGDs_sub.csv | 3:16 | 281 | 253 | 19 | 4 | 20 | 577 |
| 3015DGDt_sub.csv | 3:35 | 296 | 239 | 16 | -19 | 10 | 542 |
| 3017DGDs_sub.csv | 3:48 | 216 | 212 | 15 | 19 | 30 | 492 |
| 3019DGDt_sub.csv | 4:05 | 238 | 196 | 13 | -7 | 6 | 446 |
| 3021DGDs_sub.csv | 4:20 | 235 | 143 | 15 | 20 | 20 | 433 |
| 3023DGDt_sub.csv | 4:35 | 217 | 120 | 14 | -3 | 19 | 367 |
| 3025DGDs_sub.csv | 4:46 | 229 | 103 | 17 | 5 | 3 | 358 |
| 3027DGDt_sub.csv | 5:00 | 214 | 108 | 14 | 0 | 18 | 352 |
| 3029DGDs_sub.csv | 5:13 | 243 | 98 | 18 | 0 | 19 | 378 |
| 3031DGDt_sub.csv | 5:30 | 180 | 58 | 13 | -3 | 18 | 265 |
| 3033DGDs_sub.csv | 5:43 | 208 | 31 | 16 | 7 | 2 | 264 |
| 3035DGDt_sub.csv | 6:00 | 172 | 52 | 11 | -2 | 9 | 243 |
| 3037DGDs_sub.csv | 6:20 | 124 | 24 | 11 | 45 | -1 | 203 |
| 3039DGDt_sub.csv | 6:32 | 148 | 38 | 10 | -2 | 9 | 205 |
| 3041DGDs_sub.csv | 6:46 | 56 | -9 | 7 | -42 | 7 | 19 |
| 3043DGDt_sub.csv | 7:04 | 137 | -41 | 8 | -2 | 8 | 110 |
| 3045DGDs_sub.csv | 7:20 | 120 | -121 | 11 | 16 | 7 | 34 |
| 3047DGDt_sub.csv | -5:18 | 110 | -134 | 7 | -11 | -21 | -49 |
| 3049DGDs_sub.csv | -5:05 | -67 | -168 | -2 | 28 | 10 | -200 |
| 3051DGDt_sub.csv | -4:46 | -141 | -126 | -10 | -33 | 11 | -299 |
| 3053DGDt_sub.csv | -4:31 | -314 | -125 | -19 | -19 | 3 | -475 |
| 3055DGDt_sub.csv | -4:20 | -222 | -92 | -14 | -1 | 2 | -327 |
| 3057DGDs_sub.csv | -4:06 | -246 | -107 | -16 | 4 | -4 | -369 |
| 3059DGDt_sub.csv | -3:45 | -296 | -66 | -20 | 1 | 12 | -368 |
| 3061DGDs_sub.csv | -3:32 | -295 | -72 | -20 | 7 | -4 | -383 |
| 3063DGDt_sub.csv | -3:14 | -111 | -19 | -7 | 1 | 48 | -89 |
| 3065DGDt_sub.csv | -3:01 | -68 | -9 | -6 | 1 | -1 | -82 |
| 3067DGDt_sub.csv | -2:45 | -234 | -12 | -14 | 1 | -28 | -287 |
| 3069DGDs_sub.csv | -2:32 | -98 | 22 | -9 | 4 | -8 | -89 |
| 3071DGDt_sub.csv | -2:14 | -245 | 5 | -16 | 0 | -41 | -297 |
| 3073DGDs_sub.csv | -2:02 | -104 | 13 | -6 | 1 | -6 | -102 |
| 3075DGDt_sub.csv | -1:43 | -299 | 19 | -17 | 3 | -85 | -379 |
| 3077DGDs_sub.csv | -1:31 | -530 | -5 | -32 | 2 | 0 | -565 |
| 3079DGDt_sub.csv | -1:14 | -830 | -50 | -50 | 2 | 20 | -908 |
| 3081DGDs_sub.csv | -1:03 | -750 | -24 | -45 | 25 | -40 | -834 |

| *Filename* | *Time to HW [hh:mm]* | *Qmid [m³/s]* | *Qtop [m³/s]* | *Qbottom [m³/s]* | *Qleft [m³/s]* | *Qright [m³/s]* | *Qtotal [m³/s]* |
|---|---|---|---|---|---|---|---|
| 3083DGDt_sub.csv | -0:44 | -677 | -29 | -32 | 9 | 154 | -575 |
| 3085DGDs_sub.csv | -0:30 | -251 | -12 | -19 | 24 | -28 | -285 |
| 3087DGDt_sub.csv | -0:16 | -264 | 49 | -12 | 18 | 139 | -70 |
| 3089DGDs_sub.csv | -0:04 | 326 | 121 | 17 | 54 | -13 | 505 |
| 3091DGDt_sub.csv | 0:14 | 345 | 258 | 16 | 7 | -65 | 562 |
| 3093DGDs_sub.csv | 0:25 | 312 | 274 | 16 | 99 | -8 | 693 |
| 3095DGDt_sub.csv | 0:49 | - | - | - | - | - | - |
| 3097DGDt_sub.csv | 1:03 | 535 | 330 | 31 | 13 | -3 | 907 |
| 3099DGDt_sub.csv | 1:17 | 482 | 291 | 26 | 7 | -8 | 798 |
| 3101DGDs_sub.csv | 1:30 | 537 | 342 | 33 | 19 | -1 | 931 |
| 3103DGDt_sub.csv | 1:41 | 321 | 311 | 16 | 14 | -22 | 640 |

Concentration distribution over the cross section.

| *Filename* | *Time to HW [hh:mm]* | *Cmid [mg/l]* | *Ctop [mg/l]* | *Cbottom [mg/l]* | *Cleft [mg/l]* | *Cright [mg/l]* | *Ctotal [mg/l]* |
|---|---|---|---|---|---|---|---|
| 3003DGDt_sub.csv | 2:08 | -76 | 40 | 46 | 107 | 50 | 1 |
| 3005DGDs_sub.csv | 2:21 | -23 | 38 | 110 | 84 | 36 | 11 |
| 3007DGDt_sub.csv | 2:36 | 4 | 33 | 113 | 86 | 43 | 19 |
| 3009DGDs_sub.csv | 2:51 | -4 | 35 | 105 | 89 | 45 | 19 |
| 3011DGDt_sub.csv | 3:03 | -75 | 38 | 114 | 105 | 41 | -12 |
| 3013DGDs_sub.csv | 3:16 | -22 | 43 | 112 | 116 | 44 | 14 |
| 3015DGDt_sub.csv | 3:35 | -21 | 37 | 78 | 123 | 48 | 4 |
| 3017DGDs_sub.csv | 3:48 | -65 | 42 | 82 | 134 | 36 | -1 |
| 3019DGDt_sub.csv | 4:05 | -28 | 37 | 45 | 119 | 39 | 1 |
| 3021DGDs_sub.csv | 4:20 | -20 | 35 | 26 | 123 | 27 | 9 |
| 3023DGDt_sub.csv | 4:35 | -25 | 26 | 24 | 103 | 31 | -5 |
| 3025DGDs_sub.csv | 4:46 | -3 | 41 | 32 | 138 | 26 | 14 |
| 3027DGDt_sub.csv | 5:00 | 5 | 47 | 26 | 117 | 25 | 19 |
| 3029DGDs_sub.csv | 5:13 | 13 | 58 | 31 | 122 | 22 | 26 |
| 3031DGDt_sub.csv | 5:30 | -3 | 20 | 20 | 116 | 20 | 3 |
| 3033DGDs_sub.csv | 5:43 | 10 | 10 | 32 | 92 | 33 | 14 |
| 3035DGDt_sub.csv | 6:00 | 15 | 42 | 29 | 93 | 28 | 21 |
| 3037DGDs_sub.csv | 6:20 | -9 | 5 | 23 | 111 | 26 | 21 |
| 3039DGDt_sub.csv | 6:32 | -47 | -100 | 17 | 118 | 23 | -52 |
| 3041DGDs_sub.csv | 6:46 | -357 | 938 | -36 | 105 | 19 | -1733 |
| 3043DGDt_sub.csv | 7:04 | -108 | 370 | 9 | 116 | 19 | -273 |
| 3045DGDs_sub.csv | 7:20 | -182 | 278 | 13 | 100 | 24 | -1568 |
| 3047DGDt_sub.csv | -5:18 | -251 | 295 | -14 | 103 | 29 | 1397 |
| 3049DGDs_sub.csv | -5:05 | 646 | 310 | 286 | 108 | 53 | 463 |
| 3051DGDt_sub.csv | -4:46 | 420 | 359 | 120 | 138 | 60 | 366 |
| 3053DGDt_sub.csv | -4:31 | 233 | 266 | 87 | 108 | 126 | 232 |
| 3055DGDt_sub.csv | -4:20 | 276 | 237 | 65 | 132 | 138 | 256 |
| 3057DGDs_sub.csv | -4:06 | 257 | 244 | 46 | 122 | 122 | 244 |
| 3059DGDt_sub.csv | -3:45 | 185 | 238 | 57 | 120 | 109 | 190 |
| 3061DGDs_sub.csv | -3:32 | 193 | 215 | 65 | 140 | 122 | 191 |
| 3063DGDt_sub.csv | -3:14 | 238 | 482 | -27 | 112 | 102 | 347 |
| 3065DGDt_sub.csv | -3:01 | 225 | 691 | -12 | 117 | 90 | 262 |
| 3067DGDt_sub.csv | -2:45 | 137 | 576 | 76 | 103 | 93 | 148 |
| 3069DGDs_sub.csv | -2:32 | 243 | -51 | 46 | 117 | 108 | 290 |
| 3071DGDt_sub.csv | -2:14 | 182 | -2227 | 40 | 106 | 130 | 205 |
| 3073DGDs_sub.csv | -2:02 | 211 | -586 | 23 | 141 | 119 | 295 |
| 3075DGDt_sub.csv | -1:43 | 140 | -175 | 86 | 118 | 114 | 147 |
| 3077DGDs_sub.csv | -1:31 | 94 | 805 | 94 | 93 | 80 | 101 |
| 3079DGDt_sub.csv | -1:14 | 84 | 201 | 105 | 60 | 93 | 91 |
| 3081DGDs_sub.csv | -1:03 | 63 | 316 | 51 | 69 | 59 | 69 |

| *Filename* | *Time to HW [hh:mm]* | *Cmid [mg/l]* | *Ctop [mg/l]* | *Cbottom [mg/l]* | *Cleft [mg/l]* | *Cright [mg/l]* | *Ctotal [mg/l]* |
|---|---|---|---|---|---|---|---|
| 3083DGDt_sub.csv | -0:44 | 82 | 443 | 45 | 102 | 86 | 97 |
| 3085DGDs_sub.csv | -0:30 | 158 | 1406 | 39 | 95 | 118 | 203 |
| 3087DGDt_sub.csv | -0:16 | 135 | 214 | 99 | 130 | 137 | 71 |
| 3089DGDs_sub.csv | -0:04 | 100 | 235 | 193 | 150 | 176 | 139 |
| 3091DGDt_sub.csv | 0:14 | 98 | 200 | 189 | 187 | 176 | 140 |
| 3093DGDs_sub.csv | 0:25 | 108 | 184 | 192 | 184 | 177 | 150 |
| 3095DGDt_sub.csv | 0:49 | - | - | - | - | - | - |
| 3097DGDt_sub.csv | 1:03 | 94 | 148 | 205 | 170 | 125 | 118 |
| 3099DGDt_sub.csv | 1:17 | 106 | 177 | 155 | 158 | 119 | 134 |
| 3101DGDs_sub.csv | 1:30 | 55 | 96 | 155 | 143 | 83 | 75 |
| 3103DGDt_sub.csv | 1:41 | 33 | 104 | 175 | 134 | 87 | 71 |

Sediment flux distribution over the cross section: positive is from dock to river

| *Filename* | *Time to HW [hh:mm]* | *Fmid [kg/s]* | *Ftop [kg/s]* | *Fbottom [kg/s]* | *Fleft [kg/s]* | *Fright [kg/s]* | *Ftotal [kg/s]* |
|---|---|---|---|---|---|---|---|
| 3003DGDt_sub.csv | 2:08 | -12 | 11 | 0 | 0 | 1 | 1 |
| 3005DGDs_sub.csv | 2:21 | -7 | 12 | 2 | -1 | 0 | 7 |
| 3007DGDt_sub.csv | 2:36 | 1 | 9 | 2 | 0 | 0 | 12 |
| 3009DGDs_sub.csv | 2:51 | -1 | 9 | 2 | 0 | 1 | 11 |
| 3011DGDt_sub.csv | 3:03 | -16 | 9 | 2 | 0 | 1 | -6 |
| 3013DGDs_sub.csv | 3:16 | -6 | 11 | 2 | 0 | 1 | 8 |
| 3015DGDt_sub.csv | 3:35 | -6 | 9 | 1 | -2 | 0 | 2 |
| 3017DGDs_sub.csv | 3:48 | -14 | 9 | 1 | 3 | 1 | 0 |
| 3019DGDt_sub.csv | 4:05 | -7 | 7 | 1 | -1 | 0 | 1 |
| 3021DGDs_sub.csv | 4:20 | -5 | 5 | 0 | 2 | 1 | 4 |
| 3023DGDt_sub.csv | 4:35 | -6 | 3 | 0 | 0 | 1 | -2 |
| 3025DGDs_sub.csv | 4:46 | -1 | 4 | 1 | 1 | 0 | 5 |
| 3027DGDt_sub.csv | 5:00 | 1 | 5 | 0 | 0 | 0 | 7 |
| 3029DGDs_sub.csv | 5:13 | 3 | 6 | 1 | 0 | 0 | 10 |
| 3031DGDt_sub.csv | 5:30 | -1 | 1 | 0 | 0 | 0 | 1 |
| 3033DGDs_sub.csv | 5:43 | 2 | 0 | 1 | 1 | 0 | 4 |
| 3035DGDt_sub.csv | 6:00 | 3 | 2 | 0 | 0 | 0 | 5 |
| 3037DGDs_sub.csv | 6:20 | -1 | 0 | 0 | 5 | 0 | 4 |
| 3039DGDt_sub.csv | 6:32 | -7 | -4 | 0 | 0 | 0 | -11 |
| 3041DGDs_sub.csv | 6:46 | -20 | -8 | 0 | -4 | 0 | -33 |
| 3043DGDt_sub.csv | 7:04 | -15 | -15 | 0 | 0 | 0 | -30 |
| 3045DGDs_sub.csv | 7:20 | -22 | -34 | 0 | 2 | 0 | -53 |
| 3047DGDt_sub.csv | -5:18 | -28 | -40 | 0 | -1 | -1 | -69 |
| 3049DGDs_sub.csv | -5:05 | -43 | -52 | -1 | 3 | 1 | -93 |
| 3051DGDt_sub.csv | -4:46 | -59 | -45 | -1 | -5 | 1 | -110 |
| 3053DGDt_sub.csv | -4:31 | -73 | -33 | -2 | -2 | 0 | -110 |
| 3055DGDt_sub.csv | -4:20 | -61 | -22 | -1 | 0 | 0 | -84 |
| 3057DGDs_sub.csv | -4:06 | -63 | -26 | -1 | 0 | 0 | -90 |
| 3059DGDt_sub.csv | -3:45 | -55 | -16 | -1 | 0 | 1 | -70 |
| 3061DGDs_sub.csv | -3:32 | -57 | -15 | -1 | 1 | 0 | -73 |
| 3063DGDt_sub.csv | -3:14 | -27 | -9 | 0 | 0 | 5 | -31 |
| 3065DGDt_sub.csv | -3:01 | -15 | -6 | 0 | 0 | 0 | -21 |
| 3067DGDt_sub.csv | -2:45 | -32 | -7 | -1 | 0 | -3 | -42 |
| 3069DGDs_sub.csv | -2:32 | -24 | -1 | 0 | 0 | -1 | -26 |
| 3071DGDt_sub.csv | -2:14 | -44 | -11 | -1 | 0 | -5 | -61 |
| 3073DGDs_sub.csv | -2:02 | -22 | -8 | 0 | 0 | -1 | -30 |
| 3075DGDt_sub.csv | -1:43 | -42 | -3 | -1 | 0 | -10 | -56 |
| 3077DGDs_sub.csv | -1:31 | -50 | -4 | -3 | 0 | 0 | -57 |
| 3079DGDt_sub.csv | -1:14 | -70 | -10 | -5 | 0 | 2 | -83 |
| 3081DGDs_sub.csv | -1:03 | -47 | -8 | -2 | 2 | -2 | -58 |

| *Filename* | *Time to HW [hh:mm]* | *Fmid [kg/s]* | *Ftop [kg/s]* | *Fbottom [kg/s]* | *Fleft [kg/s]* | *Fright [kg/s]* | *Ftotal [kg/s]* |
|---|---|---|---|---|---|---|---|
| 3083DGDt_sub.csv | -0:44 | -56 | -13 | -1 | 1 | 13 | -56 |
| 3085DGDs_sub.csv | -0:30 | -40 | -17 | -1 | 2 | -3 | -58 |
| 3087DGDt_sub.csv | -0:16 | -36 | 10 | -1 | 2 | 19 | -5 |
| 3089DGDs_sub.csv | -0:04 | 33 | 28 | 3 | 8 | -2 | 70 |
| 3091DGDt_sub.csv | 0:14 | 34 | 52 | 3 | 1 | -11 | 78 |
| 3093DGDs_sub.csv | 0:25 | 34 | 50 | 3 | 18 | -1 | 104 |
| 3095DGDt_sub.csv | 0:49 | - | - | - | - | - | - |
| 3097DGDt_sub.csv | 1:03 | 50 | 49 | 6 | 2 | 0 | 107 |
| 3099DGDt_sub.csv | 1:17 | 51 | 52 | 4 | 1 | -1 | 107 |
| 3101DGDs_sub.csv | 1:30 | 29 | 33 | 5 | 3 | 0 | 70 |
| 3103DGDt_sub.csv | 1:41 | 11 | 32 | 3 | 2 | -2 | 46 |

# APPENDIX I. AVERAGE SEDIMENT CONCENTRATION FOR THE TOTAL CROSS-SECTION

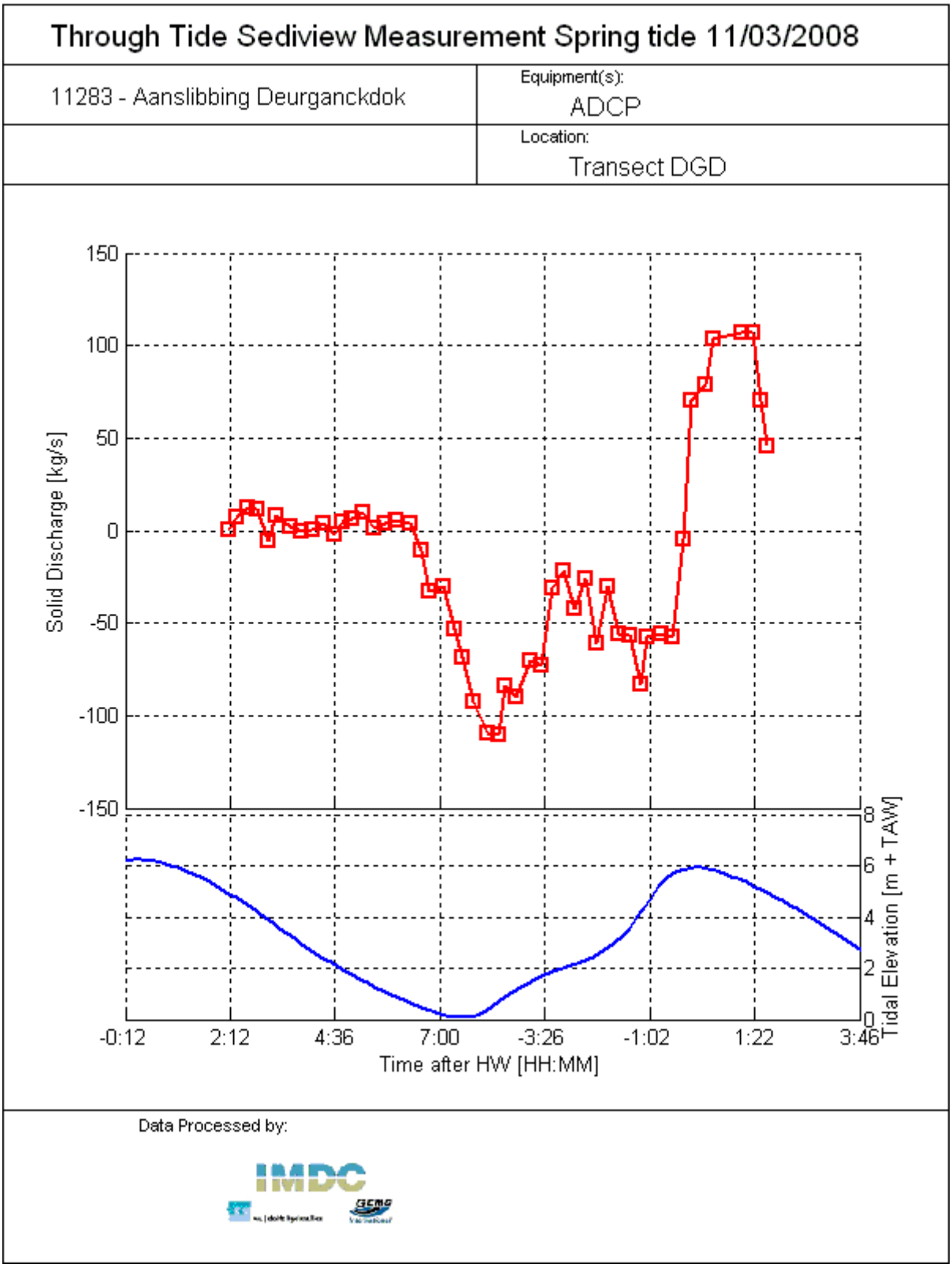
| *Transect name* | *Time [hh:mm MET]* | *Time after HW [hh:mm]* | *Average measured SS Concentration [mg/l]* |
|---|---|---|---|
| 3003DGDt_sub.csv | 7:06 | 2:08 | 64 |
| 3005DGDs_sub.csv | 7:19 | 2:21 | 58 |
| 3007DGDt_sub.csv | 7:34 | 2:36 | 53 |
| 3009DGDs_sub.csv | 7:49 | 2:51 | 58 |
| 3011DGDt_sub.csv | 8:02 | 3:03 | 73 |
| 3013DGDs_sub.csv | 8:14 | 3:16 | 79 |
| 3015DGDt_sub.csv | 8:33 | 3:35 | 69 |
| 3017DGDs_sub.csv | 8:45 | 3:48 | 73 |
| 3019DGDt_sub.csv | 9:04 | 4:05 | 59 |
| 3021DGDs_sub.csv | 9:17 | 4:20 | 62 |
| 3023DGDt_sub.csv | 9:33 | 4:35 | 59 |
| 3025DGDs_sub.csv | 9:44 | 4:46 | 61 |
| 3027DGDt_sub.csv | 9:58 | 5:00 | 47 |
| 3029DGDs_sub.csv | 10:11 | 5:13 | 50 |
| 3031DGDt_sub.csv | 10:28 | 5:30 | 41 |
| 3033DGDs_sub.csv | 10:41 | 5:43 | 46 |
| 3035DGDt_sub.csv | 10:58 | 6:00 | 41 |
| 3037DGDs_sub.csv | 11:18 | 6:20 | 42 |
| 3039DGDt_sub.csv | 11:30 | 6:32 | 46 |
| 3041DGDs_sub.csv | 11:44 | 6:46 | 48 |
| 3043DGDt_sub.csv | 12:02 | 7:04 | 58 |
| 3045DGDs_sub.csv | 12:18 | 7:20 | 74 |
| 3047DGDt_sub.csv | 12:29 | -5:18 | 77 |
| 3049DGDs_sub.csv | 12:42 | -5:05 | 95 |
| 3051DGDt_sub.csv | 13:01 | -4:46 | 128 |
| 3053DGDt_sub.csv | 13:16 | -4:31 | 124 |
| 3055DGDt_sub.csv | 13:27 | -4:20 | 123 |
| 3057DGDs_sub.csv | 13:41 | -4:06 | 123 |
| 3059DGDt_sub.csv | 14:01 | -3:45 | 113 |
| 3061DGDs_sub.csv | 14:15 | -3:32 | 122 |
| 3063DGDt_sub.csv | 14:33 | -3:14 | 108 |
| 3065DGDt_sub.csv | 14:46 | -3:01 | 103 |
| 3067DGDt_sub.csv | 15:02 | -2:45 | 96 |
| 3069DGDs_sub.csv | 15:15 | -2:32 | 108 |
| 3071DGDt_sub.csv | 15:33 | -2:14 | 110 |
| 3073DGDs_sub.csv | 15:45 | -2:02 | 125 |
| 3075DGDt_sub.csv | 16:04 | -1:43 | 121 |
| 3077DGDs_sub.csv | 16:16 | -1:31 | 95 |
| 3079DGDt_sub.csv | 16:33 | -1:14 | 87 |
| 3081DGDs_sub.csv | 16:44 | -1:03 | 89 |
| 3083DGDt_sub.csv | 17:03 | -0:44 | 98 |

| | | | |
|---|---|---|---|
| 3085DGDs_sub.csv | 17:17 | -0:30 | 109 |
| 3087DGDt_sub.csv | 17:31 | -0:16 | 120 |
| 3089DGDs_sub.csv | 17:43 | -0:04 | 154 |
| 3091DGDt_sub.csv | 18:02 | 0:14 | 161 |
| 3093DGDs_sub.csv | 18:13 | 0:25 | 164 |
| 3095DGDt_sub.csv | 18:37 | | - |
| 3097DGDt_sub.csv | 18:50 | 0:49 | 166 |
| 3099DGDt_sub.csv | 19:05 | 1:03 | 137 |
| 3101DGDs_sub.csv | 19:17 | 1:17 | 115 |
| 3103DGDt_sub.csv | 19:30 | 1:30 | 103 |

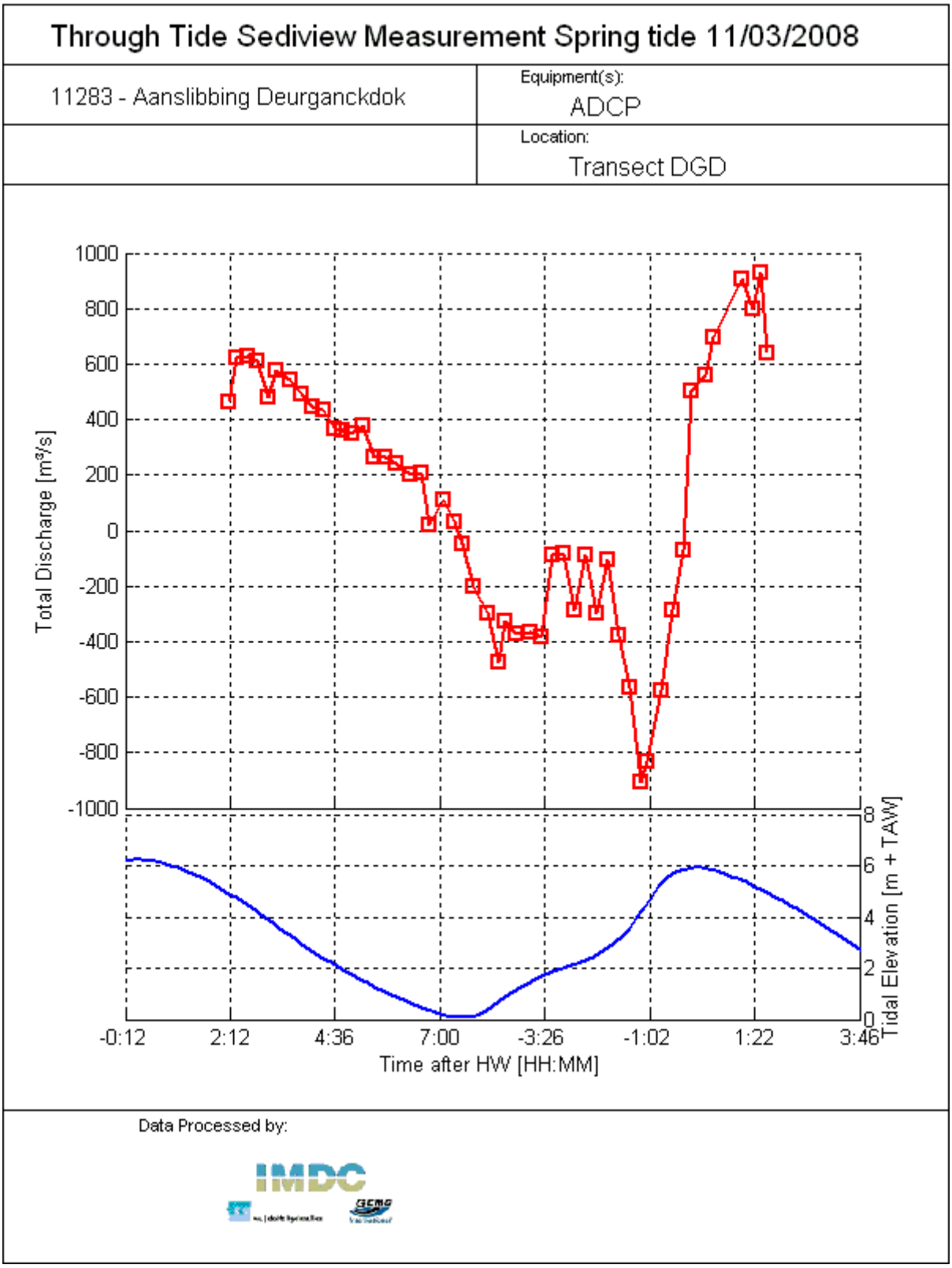
| ***Tide*** | ***Concentration [mg/l]*** | | |
|---|---|---|---|
| | ***Average*** | ***Minimum*** | ***Maximum*** |
| Ebb | | | |
| Flood | | | |

# APPENDIX J.

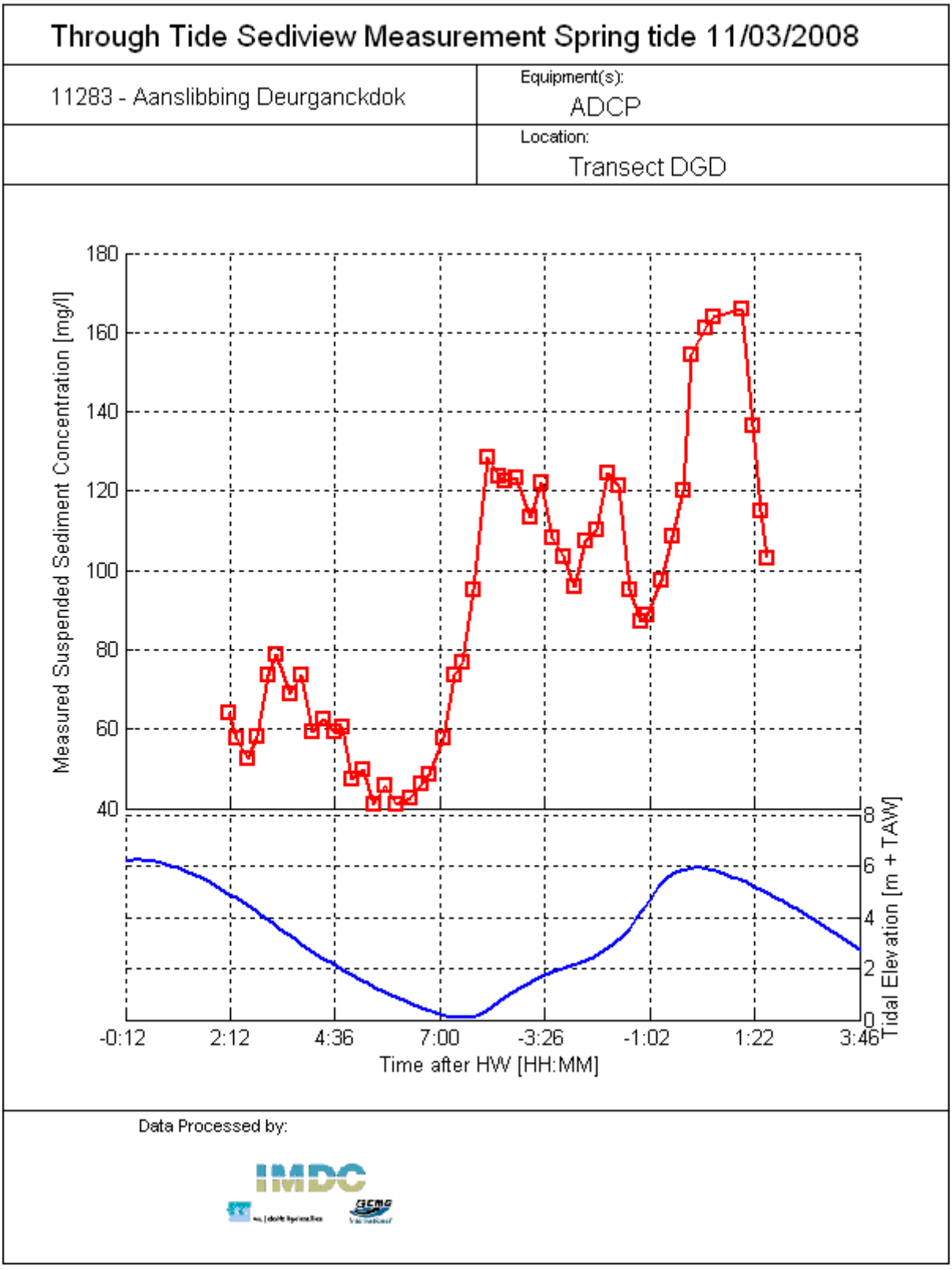
# TEMPORAL VARIATION OF TOTAL FLUX, TOTAL DISCHARGE AND SUSPENDED SEDIMENT CONCENTRATION




Total discharge through the measured cross section, positive is from dock to river




Total flux through the measured cross section, positive is from dock to river




Suspended sediment concentration through the measured cross section

# APPENDIX K.

# OVERVIEW OF HCBS2 AND AANSLIBBING DEURGANCKDOK REPORTS

| Report | Description of HCBS2 |
|---|---|
| **Ambient Conditions Lower Sea Scheldt** | |
| 5.3 | Overview of ambient conditions in the river Scheldt – January-June 2006 (I/RA/11291/06.088/MSA) |
| 5.4 | Overview of ambient conditions in the river Scheldt – July-December 2006 (I/RA/11291/06.089/MSA) |
| 5.5 | Overview of ambient conditions in the river Scheldt : RCM-9 buoy 84 & 97 (1/1/2007 -31/3/2007) (I/RA/11291/06.090/MSA) |
| 5.6 | Analysis of ambient conditions during 2006 (I/RA/11291/06.091/MSA) |
| **Calibration** | |
| 6.1 | Winter Calibration (I/RA/11291/06.092/MSA) |
| 6.2 | Summer Calibration and Final Report (I/RA/11291/06.093/MSA) |
| **Through tide Measurements Winter 2006** | |
| 7.1 | 21/3 Scheldewacht – Deurganckdok – Salinity Distribution (I/RA/11291/06.094/MSA) |
| 7.2 | 22/3 Parel 2 – Deurganckdok (I/RA/11291/06.095/MSA) |
| 7.3 | 22/3 Laure Marie – Liefkenshoek (I/RA/11291/06.096/MSA) |
| 7.4 | 23/3 Parel 2 – Schelle (I/RA/11291/06.097/MSA) |
| 7.5 | 23/3 Laure Marie – Deurganckdok (I/RA/11291/06.098/MSA) |
| 7.6 | 23/3 Veremans Waarde (I/RA/11291/06.099/MSA) |
| **HCBS Near bed continuous monitoring (Frames)** | |
| 8.1 | Near bed continuous monitoring winter 2006 (I/RA/11291/06.100/MSA) |
| **INSSEV** | |
| 9 | Settling Velocity - INSSEV summer 2006 (I/RA/11291/06.102/MSA) |
| **Cohesive Sediment** | |
| 10 | Cohesive sediment properties summer 2006 (I/RA/11291/06.103/MSA) |
| **Through tide Measurements Summer 2006** | |
| 11.1 | Through Tide Measurement Sediview and Siltprofiler 27/9 Stream - Liefkenshoek (I/RA/11291/06.104/MSA) |
| 11.2 | Through Tide Measurement Sediview 27/9 Veremans - Raai K (I/RA/11291/06.105/MSA) |
| 11.3 | Through Tide Measurement Sediview and Siltprofiler 28/9 Stream - Raai K (I/RA/11291/06.106/MSA) |
| 11.4 | Through Tide Measurement Sediview 28/9 Veremans - Waarde(I/RA/11291/06.107/MSA) |
| 11.5 | Through Tide Measurements Sediview 28/9 Parel 2 - Schelle (I/RA/11291/06.108/MSA) |
| 11.6 | Through Tide measurement 26/9 Scheldewacht – Deurganckdok – Salinity Distribution (I/RA/11291/06.161/MSA) |

| **Analysis** | |
|---|---|
| 12 | Report concerning the presence of HCBS layers in the Scheldt river (I/RA/11291/06.109/MSA) |

| **Report** | **Description of Opvolging aanslibbing Deurganckdok between April 2006 till March 2007** |
|---|---|
| **Sediment Balance: Bathymetry surveys, Density measurements, Maintenance and construction dredging activities** | |
| 1.1 | Sediment Balance: Three monthly report 1/4/2006 – 30/06/2006 (I/RA/11283/06.113/MSA) |
| 1.2 | Sediment Balance: Three monthly report 1/7/2006 – 30/09/2006 (I/RA/11283/06.114/MSA) |
| 1.3 | Sediment Balance: Three monthly report 1/10/2006 – 31/12/2006 (I/RA/11283/06.115/MSA) |
| 1.4 | Sediment Balance: Three monthly report 1/1/2007 – 31/03/2007 (I/RA/11283/06.116/MSA) |
| 1.5 | Annual Sediment Balance (I/RA/11283/06.117/MSA) |
| 1.6 | Sediment balance Bathymetry: 2005 – 3/2006 (I/RA/11283/06.118/MSA) |
| **Factors contributing to salt and sediment distribution in Deurganckdok: Salt-Silt (OBS3A) & Frame measurements, Through tide measurements (SiltProfiling & ADCP)** | |
| 2.1 | Through tide measurement Siltprofiler 21/03/2006 Laure Marie (I/RA/11283/06.087/WGO) |
| 2.2 | Through tide measurement Siltprofiler 26/09/2006 Stream (I/RA/11283/06.068/MSA) |
| 2.3 | Through tide measurement Sediview spring tide 22/03/2006 Veremans (I/RA/11283/06.110/BDC) |
| 2.4 | Through tide measurement Sediview spring tide 27/09/2006 Parel 2 (I/RA/11283/06.119/MSA) |
| 2.5 | Through tide measurement Sediview average tide 24/10/2007 Parel 2 (I/RA/11283/06.120/MSA) |
| 2.6 | Salt-Silt distribution & Frame Measurements Deurganckdok 13/3/2006 – 31/05/2006 (I/RA/11283/06.121/MSA) |
| 2.7 | Salt-Silt distribution & Frame Measurements Deurganckdok 15/07/2006 – 31/10/2006 (I/RA/11283/06.122/MSA) |
| 2.8 | Salt-Silt distribution & Frame Measurements Deurganckdok 12/02/2007 – 18/04/2007 (I/RA/11283/06.123/MSA) |
| 2.9 | Calibration stationary equipment autumn (I/RA/11283/07.095/MSA) |

| Report | Description of Opvolging aanslibbing Deurganckdok between April 2006 till March 2007 |
|---|---|
| **Boundary Conditions: Upriver Discharge, Salt concentration Scheldt, Bathymetric evolution in access channels, dredging activities in Lower Sea Scheldt and access channels** | |
| 3.1 | Boundary conditions: Three monthly report 1/1/2007 – 31/03/2007 (I/RA/11283/06.127/MSA) including HCBS 2 report 5.5 |
| ~~3.2~~ | ~~Boundary condtions: Annual report (I/RA/11283/06.128/MSA)~~[1] |
| **Analysis** | |
| 4.1 | Analysis of Siltation Processes and Factors (I/RA/11283/06.129/MSA) |

[1] considered in report 5.6 'Analysis of ambient conditions during 2006' (I/RA/11291/06.091/MSA) in the framework of the study 'Extension of the study about density currents in the Beneden Zeeschelde'